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POSITIONING FOR SUCCESS: THE INNOVATION OF VIRTUAL TEAMS

by

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The competitive, global nature of business and the development of robust telecommunication network technology has led organizations to design new business processes for organizing work to maintain a competitive advantage. Specifically, organizations have begun using virtual teams as a solution to optimizing dispersed resources. Virtual teams are geographically dispersed groups of people linked together by a common purpose and advanced computer and telecommunication technologies. This organizational design provides optimum teaming of world-class competencies by linking together employees who might not otherwise be available to work together. This research studies American Management System's use of virtual teams to identify design factors and alignments that are crucial for virtual team success. The study reveals four basic components for virtual team success: 1) selecting the right team members, 2) identifying a clear and common purpose, 3) building a high-performance technical infrastructure, and 4) sustaining a organizational culture that supports information sharing. Findings from the AMS case study determine seven lessons learned for the successful implementation of virtual teams. These findings also demonstrate the potential applicability of virtual teams within the DoD/DoN environment in the context of specialized functions and projects.

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POSITIONING FOR SUCCESS: THE INNOVATION OF VIRTUAL TEAMS

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ABSTRACT

The competitive, global nature of business and the development of robust telecommunication network technology has led organizations to design new business processes for organizing work to maintain a competitive advantage. Specifically, organizations have begun using virtual teams as a solution to optimizing dispersed resources. Virtual teams are geographically dispersed groups of people linked together by a common purpose and advanced computer and telecommunication technologies. This organizational design provides optimum teaming of world-class competencies by linking together employees who might not otherwise be available to work together. This research studies American Management System's use of virtual teams to identify design factors and alignments that are crucial for virtual team success. The study reveals four basic components for virtual team success: 1) selecting the right team members, 2) identifying a clear and common purpose, 3) building a high-performance technical infrastructure, and 4) sustaining a organizational culture that supports information sharing. Findings from the AMS case study determine seven lessons learned for the successful implementation of virtual teams. These findings also demonstrate the potential applicability of virtual teams within the DoD/DoN environment in the context of specialized functions.

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A. PURPOSE

This thesis examines the significance and applicability of virtual teams within organizations today. To accomplish this goal, research will examine the organizational conditions that spurred the evolution of virtual teams in today's organizations. Using American Management Systems, Inc. (AMS) as a case study, I will focus on the design factors and alignments that are crucial for virtual team success. The study's ultimate objective is to define the characteristics that represent the essential building blocks in the development and practice of virtual teams and describe lessons learned from AMS's implementation of virtual teams.

B. BACKGROUND

As business continues to globalize and work is no longer specialized in narrow functions but dispersed throughout organizations, effective development and use of virtual teams becomes critical for some organizations to sustain a competitive advantage. The Department of Defense (DoD) environment has changed substantially with budget constraints, a reduced work force, and new technology reshaping its organizational structure. What worked in the past may not be effective now. Simply fine tuning business practices and forcing technology on the problem may not be the answer.

Virtual team concepts are relatively new to corporate America. They were born out of the need for companies to leverage knowledge and resource utilization that were limited under older corporate structures. Similarly, the DoD finds itself in this

environment of high-technology innovation, global multifaceted challenges, and strained resources requiring unique teaming requirements. It must also rethink its position on how it will combine the resources of many specialized experts scattered throughout the world and perhaps consider adopting some of the principles of virtual teams.

To best understand the virtual team concept, it is helpful to examine an organization that has evolved in the use of virtual teams to support its corporate strategy. American Management Systems, Inc. has used virtual teams as a basis for its organizational design to maintain a competitive advantage. By analyzing the use of virtual team concepts at American Management Systems, Inc., we will be able to identify key elements for virtual team success and develop a list of lessons learned essential for virtual team improved processes and success. The data can then be examined and recommendations made as to how virtual teams can be utilized within the DoD.

Many organizations ultimately realize that the rewards of change outweigh the risks. In today's rapidly changing business environment, the DoD must align itself with its environment and arrange resources internally in support of that alignment. Implementing virtual teams is one approach to managing this business processes transformation.

C. RESEARCH QUESTIONS

1. Primary Research Question

What successful elements and lessons learned from American Management Systems application of virtual teams can be integrated within the DoD environment?

2. Secondary Research Questions

a. What is the definition of a virtual team?

b. What external conditions influence organizations to transition towards virtual teams?

c. What are the essential building blocks necessary for the successful contribution of virtual teams within an organization?

d. What role does information technology play in virtual teams?

D. SCOPE

This research will address the case for including virtual team strategies within the DoD environment by using a case study of American Management Systems, Inc. It will include a literature review of virtual team concepts and issues that are guiding the redesign of fundamental business processes. The design factors crucial for virtual team success will be examined, with concentration on defining the characteristics that represent the essential building blocks in the development and practice of virtual teams.

E. METHODOLOGY

This study's first objective is to provide an overview of virtual team concepts and characteristics. This will be accomplished through a literature review of sources including, but not limited to, the following:

- References, publications and electronic media (e.g., National Technical Information Service) available at the Naval Postgraduate School (NPS) library
- Published academic research papers
- Internet web-sites and homepages (DoD, commercial, and academic)

The next objective is to perform a case analysis of virtual team application at American Management Systems, Inc. The primary source of this information is interviews

with American Management System, Inc. employees and assessment of American Management System, Inc. Best Practices directives. Lessons learned and DoD utilization of virtual teams will be extracted from the case analysis.

F. ORGANIZATION

Chapter II provides an overview of literature to examine the reasons for using virtual teams, their benefits, and factors influencing their success. Chapter II also provides background information on the characteristics of virtual teams and their differences from traditional teams. The chapter concludes with a discussion of new technology in the workplace that can support virtual team interaction.

Chapter III introduces the American Management Systems, Inc. case study as a vehicle to explore the application of virtual team concepts. This chapter describes the research focus and approach. It provides background information on AMS including its mission and strategy. In addition, this chapter looks at why AMS is using virtual teams and where virtual teams are implemented across its organization.

Chapter IV examines virtual team roles and functions at AMS, Inc. It provides insight into the development and management of virtual teams and the tools used by these teams. Additionally, the chapter looks at how trust is established within AMS virtual teams. The chapter ends by identifying the important roles culture and technology play in supporting virtual teams.

Chapter V (Summary, Conclusions, and Recommendations) summarizes the research findings, answers the research questions, and presents recommendations for

further research and study. This chapter also includes a listing of lessons learned from the AMS case analysis.

G. BENEFITS OF STUDY

The primary benefit of this study will be to stimulate DoD interest towards utilizing virtual teams and provide insight into the importance and applicability of pursuing virtual team concepts within the DoD environment. It will demonstrate the successful application of virtual teams in a competitive market environment and investigate the current and future implementation benefits to defense commands. This study will also provide the virtual team design characteristics that represent the essential building blocks proven critical to virtual team success. The information in this study should be applicable to commands throughout the DoD.

II. VIRTUAL TEAM BACKGROUND

A. CHAPTER INTRODUCTION

Recently, one of the most significant intraorganizational structural changes has been the use of team-based business processes. Organizations have recognized teams' proven worth at improving productivity, creativity, product or service quality, and employee quality of life. (Katzenbach & Smith, 1993) The team concept has reshaped organizational work environments and dramatically shifted managerial and leadership perspectives towards new competitive strategies for managing productivity. (Katzenbach & Smith, 1993)

We are now moving towards a distributed work force that utilizes electronic technology to link workers and functions at work sites around the world. This change is radically altering the nature of work and work teams. Corporate managers are now confronted with the formidable task of developing strategically flexible organizations that are responsive to increasingly competitive global marketplaces. In response to these challenges, a unique approach to organizational design has been developed, the virtual team, which enables organizations to provide team-based productivity advantages in environments not previously attainable due to time and space constraints. The new generation of computer technology, telecommunications, and information exchange has provided the foundation on which virtual teams can function. Virtual teams allow for the essential workforce to be located anywhere in the world, where employee expertise exists. (Lipnack & Stamps, 1997)

But what is a virtual team? What are the reasons for their use? What are the characteristics and benefits of virtual teams? Are these characteristics the same for every organization?

This chapter addresses these and other questions. It begins with a working definition and discussion of the logic behind traditional work teams and virtual teams. It includes background on the reasoning behind and benefits associated with the use of virtual teams. Next is a discussion of team characteristics that result in successful virtual teams. Virtual team communication will also be introduced because of the critical role that it plays in virtual team organizations. The final section discusses the technology needed to support virtual teams, which is an important part of successful team design.

B. BACKGROUND ON TRADITIONAL TEAMS

1. Team Basics

Team-based work processes are a powerful tool for improved organizational performance. In *The Wisdom of Teams,* Jon Katzenbach and Douglas Smith focus on teams as the primary building blocks of improved company performance in the organization of the future:

> Teams will help direct, energize, and integrate...broad-based changes in behavior. They will set performance aspirations, intensify focus and commitment, energize work forces, build core skills, and spread knowledge to those who need it the most to perform. (Katzenbach & Smith, 1993)

Researchers provide many definitions of a team. One of the more accepted definitions comes from Katzenbach and Smith:

> A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable. (Katzenbach & Smith, 1993)

Work teams are collections of individuals, usually two to thirty people, organized to accomplish specific business objectives. The team approach is designed to exploit the talents of individuals by drawing on a collection of varying talents to break through traditional thinking and create dramatic performance improvement. The team characteristics of being committed to a common purpose, performance goals, and approach, and holding team members mutually accountable enable them to build upon the contributions of individuals and achieve greater results than can be accomplished by individuals alone. The broader mix of skills and know-how enables teams to respond to multifaceted challenges. It also provides for greater flexibility and responsiveness to changing events and demands. Furthermore, the social dimension of teams, when properly positioned, motivates people to excel. (Katzenbach & Smith, 1993)

A team's purpose must equate with its performance objectives. Commonly, teams have been described as having a specific, defined performance task that workers can easily recognize and respond to. The team's performance goals must be defined clearly by the team leader and built into all components of team organization. Team members are then chosen with varied and complementary skills required to accomplish the assigned group task.

Team member skills typically fall into one of four categories: technical or functional area expertise; interpersonal skills; strategic planning ingenuity; and breakthrough thinking. All categories are responsible for providing new insights, creative

alternatives, synthesis of ideas, and a fresh perspective. Most team members conduct multiple types of functions within the teams and think creatively to formulate practical task solutions that advance the teams performance.

Figure 1.1 shows the underlying team building blocks as described by Jon Katzenbach and Douglas Smith in *The Wisdom of Teams.* These building blocks form a team framework that must be in harmony to generate improved performance results. The significance behind this model is that it demonstrates the existence of a critical connection between performance and teams:

> Focusing on performance—not chemistry or togetherness or good communications or good feelings—shapes teams more than anything else. (Katzenbach & Smith, 1993)

The application of these basics allows teams to move beyond individual roles and accountability. The vertices of the model denote what teams can deliver and contribute to an organization. The sides and interior describe the necessary building block of discipline and behavior to make this happen. These building blocks can be considered as the managing mechanisms. (Katzenbach & Smith, 1993) The key point here is that team formation poses a particular challenge for organizations and for teams to outperform individuals. Both managers and team members must focus on performance and team basics, not allowing themselves to think teams are created with little forethought or effort.

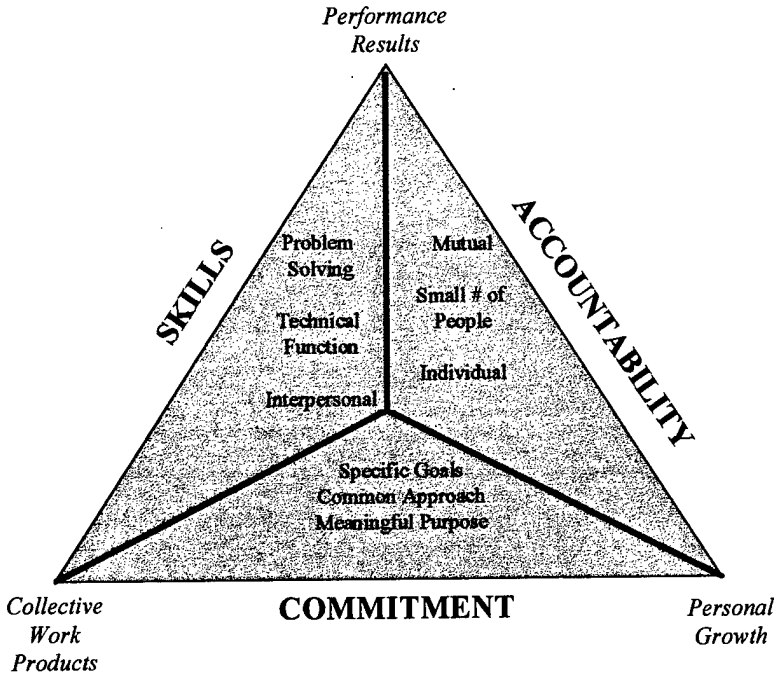


Figure 1.1, Team Basics, from (Katzenbach & Smith, 1993).

2. Why Teams?

Only after we have a clear understanding of the characteristics of teams can we fully assess the reasons that make teams a good strategy for improved organizational performance. People are clearly an organization's most important asset, and team approaches have capitalized on the opportunity for optimally utilizing human resources in an approach that surpasses performance of individuals alone.

There are numerous reasons organizations believe teams make good strategic sense. In almost all cases, the fundamental perspective for the use of teams has been the notion of improved productivity, increased flexibility to adapt to a constantly changing innovative business environment, improved product or service quality, and enhancement of employee quality of life. In short, organizations are using teams as a business advantage

to enhance competitiveness through the use of its people. In *Business without Bosses,* Manz and Sims focus on productivity as the underlying reason for the team concept:

> From a management viewpoint, productivity is typically the main reason to implement a team system. Teams are a way to undertake continuous improvement designed to increase productivity. (Manz & Sims, 1993)

Not accounted for in the productivity point of view described above are additional reasons behind the use of teams. Given the dynamic environment and changing client requirements, adaptability becomes a predominant success factor. Each unit must be able to respond quickly if it is expected to make the required contributions to the overall organization. Teams are given the freedom to draw upon the necessary skills needed to meet these challenges. This freedom includes being able to make informational alliances with other teams and external sources under loosely defined guidelines and protocols. Dumaine summarizes this strong suit of teams by saying:

> ...Getting at the heart of what makes teams tick: cross-functionalism, as the experts inelegantly put it. The team draws together people with different jobs or functions - marketing, manufacturing, finance, and so on. The theory is that by putting their heads together, people with different perspectives on the business can solve a problem quickly and effectively. (Dumaine, 1990)

The combined set of skills and experience enables teams to quickly adapt and respond to multifaceted challenges. It allows for greater flexibility and responsiveness to changing events and demands.

An equally important aspect of teams is their ability to enhance organizational learning. Shared information allows for the development of a growing corporate knowledge bank that is a linking mechanism for a continuous and innovative learning environment.

Teams also help organization members become more committed to corporate goals. Often employees find their role in achieving corporate goals intangible. The company may want to raise revenue by 20 percent. An employee in the sales department may clearly understand that s/he needs to increase sales volume by $2.5 million. But employees in the accounting and information technology departments may find their role in meeting this goal less obvious. Because members of a successful team share a common purpose and are held mutually accountable for their performance, they have a better understanding of the goals of the team and what their role is in achieving these goals. This clearer definition of purpose and accountability helps tie team members back to the individual team goals as well as the overall corporate goals.

Clearly, organizations must view human resource management as a substantial element contributing to the development and execution of overall organization strategy. Teams have provided organizations with new ways of obtaining a competitive advantage and thus their role will continue to expand and unfold into new business areas.

C. NEED FOR VIRTUAL TEAMS

The evolution from traditional team-based organizational design to virtual teams is a recent phenomenon. In today's organizations, traditional team-based processes have become the competitive standard. However, companies now face significant, new complex challenges in the marketplace. Flexibility, adaptability, meeting customer expectations, global competition, time compression, rapid technology change , and complexity are just a few of the factors driving an organization's strategic thinking to meet these challenges. For an increasing number of organizations, the ability to successfully

complete a variety of geographically distributed workplace tasks and projects in a timely manner has become essential for maintaining a competitive advantage. (Fisher & Fisher, 1998) The emergence of virtual teams directly addresses the new challenges and influences the methods of how business processes will be constructed.

Virtual teams sustain change in strategically flexible organizations by addressing new workforce demographics, where the best employees may be geographically dispersed around the world, and where employees require increasingly sophisticated technology and personal flexibility to accomplish work tasks. Optimum teaming of world-class competencies of knowledge workers, in real time, augmented by the use of electronic systems supporting knowledge and information, is the business process required in today's organizations with geographically distributed resources. This new global nature of competitive business processes can be accomplished through the use of virtual teams. Virtual teams are desirable because through technology they can optimize and adapt these dispersed competencies and resources in collaborative effort tasks.

Numerous additional factors create the need for transition towards virtual teams; for example, social factors such as people's desire to work at home, to void traffic congestion, to provide childcare, and to cope with handicaps, make working in virtual teams appealing. Furthermore, businesses can reduce costs by having employees work in virtual teams. This leads to less demand for buildings, parking, and costly overhead support requirements.

D. WHAT IS A VIRTUAL TEAM?

Many different definitions of virtual teams exist. Jessica Lipnack and Jeffrey Stamps provide one of the more useful definitions when they describes a virtual team as:

> . . . a group of people who interact through interdependent tasks guided by common purpose . . . Unlike conventional teams, a virtual team works across space, time, and organizational boundaries with links strengthened by webs of communication technologies. (Lipnack & Stamps, 1997)

In addition to sharing characteristics of a traditional team, what virtual teams have in common is listed below:

- Virtual team members are physically part of the same organization or different organizations. (Lipnack & Stamps, 1997)
- Team members come from both a variety of different organizations and organization functions collaborating on a variety of workplace tasks. (Lipnack & Stamps, 1997)
- Virtual teams are linked primarily through advanced computer and telecommunication technologies. (Lipnack & Stamps, 1997)
- Virtual teams usually share little except a common project or tasking purpose. (Lipnack & Stamps, 1997)
- Teams are transient, project focused, and disbanded with project completion. (Dubinskas, 1993) (Davidow,1992)

Table 1.1 summarizes the fundamental differences between virtual teams and traditional teams. From this table it can be seen that virtual teams offer increased flexibility over traditional teams. But, to achieve this flexible environment, virtual teams also require additional team member skills.

Traditional Teams	Virtual Teams
Members from same organization	Members from different organizations, companies
Members trained and often certified against established standards	Members selected because of demonstrated competence
Roles and expectations per job titles	Expected to perform by situation
Hope for trust	Require trust
Work processes rigid and defined	Work processes flexible and adaptive
Position authority	Knowledge authority
Persuade through power	Persuade through influence
Assert one's perspective	Negotiate, make tradeoffs
Stable work environment	Environment continually changes
Formal communication minimized	Continuous structured communications
Members work together – together	Members work together – apart
Hierarchical	Hierarchical and Networked

Table 1.1, Virtual/Traditional Team Comparison, from (Grenier & Metes, 1995).

E. VIRTUAL TEAM CHARACTERISTICS

In their book, *Virtual Teams, Reaching Across Space, Time, And Organizations With Technology,* Jessica Lipnack and Jeffrey Stamps describe a three-part model of the virtual team concept—people, purpose, and links. These three components capture the essential qualities of successful virtual teams. People populate small groups and teams of every kind at every level. Purpose holds all groups together, but for teams, the task—the

work that expresses the shared goals—is the purpose. Links are the channels, interactions, and relationships that weave the living fabric of a team unfolding over time. The greatest difference between in-the-same-place teams and virtual teams lies in the nature and variety of their links. (Lipnack & Stamps, 1997)

The People/Purpose/Links model, shown in Figure 1.2, is further broken down and characterized in nine Virtual Team Principles, which provide the essential building blocks for the conception and management of virtual teams. These principles and explanations are provided below in Table 1.2.

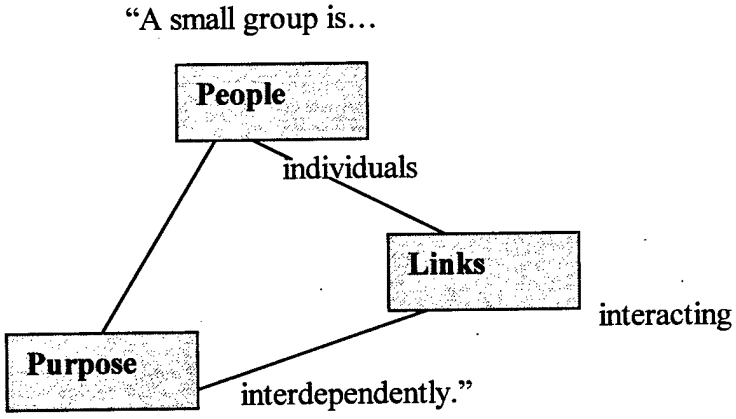
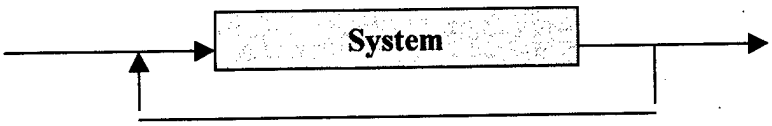


Figure 1.2, Virtual Team Model, from (Lipnack & Stamps, 1997).

The principles of people, purpose, and links form a simple systems model of inputs, processes, and outputs. Developing a virtual team begins with independent people, cooperative goals, and multiple media. As the team transitions and adapts over time, people share leadership direction and authority, undertake interdependent tasks, and engage in various boundary-crossing interactions. As the team's life cycle unfolds, it produces concrete results, formulates integrated levels of organization, and fosters integrity and trusting relationships (Figure 1.3). (Lipnack & Stamps, 1997)

Virtual Team Building Blocks		
Building Block	**Definition**	**Characteristics**
People		
Independent members	▪ Parts	▪ People with a modicum of autonomy and self reliance
Shared Leadership	▪ Parts-as-wholes	▪ Norm ▪ Many informal leaders ▪ Knowledgeable people take the lead as circumstances require
Integrated levels	▪ Wholes	▪ Both internally and externally ▪ Bands of involvement
Purpose		
Cooperative goals	▪ Do	▪ Share a common vision and values ▪ Continually learning and improving ▪ Empowered ▪ Enabled with technology, facilities, education and assignments
Interdependent tasks	▪ Doing	▪ Connects desires at the beginning with outcomes at the end
Concrete results	▪ Done	▪ The measurable output of joint effort
Links		
Multiple media	▪ Channels	▪ Pathways for interactions and the development of relationships
Boundary-crossing interactions	▪ Communicating	▪ The back and forth communication between people
Trusting relationships	▪ Patterns	▪ Climate of respect ▪ Invisible bonds

Table 1.2, Virtual Team Building Blocks, from (Lipnack & Stamps, 1997)



	Inputs	Processes	Outputs
People	Independent Members	Shared Leadership	Integrated Levels
Purpose	Cooperative Goals	Interdependent Tasks	Concrete Results

Figure 1.3, Virtual Team System of Principles, from (Lipnack & Stamps, 1997)

Virtual teams are constructed of independent members whose attributes support working within a self-reliant work environment. Leadership tends to be informal with most team members taking a leadership role at some point based on individual technical and management expertise required. The virtual team has two distinct levels of organization, the level of the team member and the level of the virtual team as a whole. To be effective virtual teams must successfully integrate these levels into their business process design. (Lipnack & Stamps, 1997)

The purpose of the tasking substantiates and gives direction about why a particular group was selected to work together as a virtual team. Because they operate outside the bounds of a traditional organizational work framework supported by rules and regulations to guide them, they must rely on their common purpose to stay in tune. Cooperative goals

are how the purpose should be defined at the beginning of any successful teaming process. Interdependent tasks enable teams to accomplish the desired purpose defined at the beginning with outcomes and concrete results at the end. (Lipnack & Stamps, 1997)

What partially makes virtual teams distinctive are their links. Multiple media provides the actual physical connections—wires, phones, computers, etc. that make boundary-crossing interactions possible. "The communication exchanges between team members—their courses of action and behaviors—constitute the actual process of work. Through these interactions, people develop trusting relationships."(Lipnack & Stamps, 1997)

These principles of virtual teaming are not just nice-to-have options or desirable traits; they represent the capabilities and behaviors needed to succeed in complex knowledge work in virtual environments. (Grenier & Metes, 1995) The virtual team principles and attributes discussed in this section characterize what is considered necessary for virtual teams to function effectively. How an organization develops and adapts to these characteristics will ultimately gauge the success of virtual teams.

F. BENEFITS OF VIRTUAL TEAMS

Virtual teams are defined as geographically separated team members primarily interacting through the use of some form of electronic communication. But why virtual teams? What benefits are gained from their use? A virtual team is much more than just a group of coworkers geographically dispersed. By creating virtual teams, organizations can realize teamwork advantages and capitalize on the competitive advantages of telecommunication and information technology throughout a global marketplace. The

following paragraphs outline the key points that underlie the benefits behind the use of virtual teams.

Virtual teams are a logical result of the increasing prevalence of flat or horizontal organizational structures. The emergence of the flat or horizontal organization is largely a response to increasingly competitive environments brought about by increased global competition and recent advancements in both information and transportation technologies. (Bettis, 1996) Organizational flattening pushes decision authority to lower levels in the organization, reducing the need for several layers of management. With fewer layers of centralized, hierarchical management structure, organizations with a wide variety of product or service lines become increasingly characterized by structurally and geographically distributed human resources. While the organization may retain the collective talent it requires, there is a reduction in the opportunity for linkages between remaining employees (e.g., personnel and offices close enough to facilitate traditional interaction). This kind of structural environment creates the need to reconstitute the benefits of the large, resource-rich organization within the context of the new flattened organization. (Townsend, 1998) Virtual teams allow that reconstitution to occur.

Virtual teams produce information-based products or services by accessing, sharing, and processing electronic information, and by building collaborative knowledge through electronic communications: networks, shared databases, groupware applications, and so forth. (Grenier & Metes, 1995) Virtual teams can be collaboratively empowered. Since virtual team members are interacting through the computer, it is easy to enhance the quality of their work through software products such as Lotus Notes and group decision support systems designed to facilitate work collaboration. A variety of software products

have been designed to improve the quality of decision making and team creativity, as well as enhance team members' ability to work with data and create documents. (Schrage, 1995)

A factor encouraging the development of virtual teams is the continued shift from manufacturing and production jobs to service and knowledge work. Production processes, by their very nature, are often more structured and defined. Service activities often require cooperation of team members in dynamic work situations that evolve according to customer requirements. The hallmark of successful service firms has been their ability to flexibly respond to the customer's needs as quickly as possible. This requisite flexibility fuels the movement from highly structured organizational forms to more ad hoc forms. Townsend describes virtual team flexibility when he states:

> Virtual teams enable this organizational flexibility because they integrate the effectiveness of traditional teamwork with the power of advanced communication and information technologies, allowing them to accommodate increased dynamism in both team membership and task structure. (Townsend, 1998)

In *Going Virtual,* Ray Grenier and George Metes provide a succinct summary of virtual team benefits for organizations that find themselves in a complex task/rapid respond environment. Virtual teams:

- Effectively deal with the realities of time compression, distributed resources, increasing dependency on knowledge-based input, the premium on flexibility and adaptability, and the fact that most of the information we use today is in electronic form.
- Enable the recruitment of the best competencies available, not just those in the organization or the neighborhood.
- Take advantage of the electronic infrastructure, enabling the teams to:
  - work in parallel rather than serially

- have continuous access to the latest and best knowledge and information
- participate from their home-sites, without abandoning other threads in their multiplexed work and home lives
- bring new team members up to speed through the online record of the ongoing work
- capture their learning electronically, making it easy for other teams to access this learning, often in real time (Grenier and Metes, 1995)

Finally, optimal configuration, dynamic membership, and collaborative empowerment give virtual teams productivity potential that exceeds that of traditional teams. (Townsend,1996)

G. VIRTUAL TEAM COMMUNICATIONS AND INFORMATION SHARING

Good communication is the cornerstone of effective teamwork, yet, the importance of communication is often overlooked. Grenier and Metes claim that communication must be considered as work just like any other task specific assignment. They state:

> Communication is regarded as work, not as an adjunct, or support function for work. Because of its complex critical role in virtual operations, communication must be designed; communication will not just happen. (Grenier & Metes, 1995)

In a virtual team environment, communication is not only key for project success, it becomes the binding element that joins the team together. In short, virtual teams rely on communication for their basic existence.

Recent advances in computer and telecommunications technology allow for virtual team communication to exist. Because these technologies define the operational

environment of the virtual team, it is critical to examine how these computer technologies come together with traditional communication methods to form the communication infrastructure for virtual teamwork. It is this infrastructure that enables interactions within the team and provides technological empowerment to the virtual teams' operation. (Osterlund, 1997)

While virtual teams are highly dependent on new technology, they still rely on some traditional forms of communication such as face-to-face meetings and voice communications to establish and strengthen team member relationships. One challenge a virtual team faces is learning when the use of technology is appropriate and when certain tasks require human-to-human contact. Often virtual teams become over-dependent on electronic communication because of personal comfort or the expense of face-to-face meetings. Yet, there are certain tasks that require a more media-rich communication format. When teams have conflicts, trust problems or violated expectations, face-to-face meetings can speed up resolutions. (Fisher & Fisher, 1998) Additionally, virtual teams, like traditional teams, need to celebrate victories together. There is no virtual equivalent of sharing a beer for a job well done. (AMS Interview, 1998)

The use of the telephones is an easily overlooked communication medium that enables virtual teams to function effectively. Today, the use of voice mail and advanced phone systems allow messages to be sent easily throughout the team regardless of location and availability. Voice mail has become the much-enhanced virtual equivalent of walking to a co-worker's office to ask a question. The big advantage of voice mail is that it allows asynchronous communication; the information seeker can request information as needed it and the information provider can respond when s/he is available. Voice mail plays a vital

role in the communication infrastructure of the virtual team environment. The primary challenge with this technology is maximizing its productivity benefits without suffering information overload. The key to effective use of voice mail is defining voice mail etiquette. The team must define: how often should voice mail be checked, how to leave effective voice mail, and what to do if someone is on leave. Designing clear protocols helps team members to apply this technology effectively. (Fisher & Fisher, 1998)

Although virtual teams may be possible with simple e-mail systems and telephones, it is the wide variety of new computer and telecommunication tools that enable the successful application of virtual teams. In their article, *Virtual Teams: Technology and the workplace of the future,* Townsend, DeMaried, and Hendrickson state that it is helpful to consider these tools as belonging to one of three broad categories of technology: desktop videoconferencing systems (DVCS), collaborative software systems, and the Internet and intranets. (Townsend, 1995) These three technologies are summarized below.

Desktop Videoconferencing Systems (DVCS) : Although virtual teams would be possible with simple e-mail systems and telephones, DVCS attempts to recreate the face-to-face interactions of traditional teams, making possible more complex levels of communication among team members. (Townsend, 1995) Although technologically sophisticated, the DVCS is a relatively simple system consisting of voice and video transmissions. Systems range from an elaborate DVCS conference room with several cameras connecting multiple sites, to a single small camera mounted atop a personal computer monitor. Software on the user's computer manages connections. The final component of the system is a high-speed data connection, which may be accomplished

through local area network connections, or specialized digital phone lines. (Townsend, 1995)

While DVCS is a practical business solution today, it is expensive, and its use is not widespread among individual computer users (telecommuters) because of the need for additional hardware (camera) and limited available bandwidth. As the cost of this technology decreases, DVCS hardware and software will eventually become coupled with all personal computers. Additionally, telecommunications companies are focusing increased attention on meeting the public's increased need for affordable bandwidth. Companies are replacing outdated lines with fiber optic cable capable of supporting the increase bandwidth requirements of voice, data, and video. The use of DVCS technology will continue to grow as the cost of the technology decreases and available transmission bandwidth increases. The combination of affordability and operational simplicity make DVCS an affordable organizational communications solution and a key component in the virtual team communication infrastructure. (Brookshaw, 1997)

Collaborative Software Systems: Today's sophisticated software provides much more than basic e-mail. The successful introduction of computers and computer networks in the 1980s led to many procedural and cultural changes in the workplace. By the 1990s, a new corporate language consisting of terms like the world-wide-web browsers, telecommuting, video teleconferencing (VTC), and virtual teams had permeated the workplace. As companies began exploring the concept of virtual teams, the need for a new breed of collaborative software systems, often called GroupWare, emerged. GroupWare can be defined as computer software and hardware that supports interactive

environments. It fosters communication and coordination that allows people to work together in a collaborative, better way.

Collaborative software systems are designed to facilitate real-time group decision making and other creative activities. These systems are specifically designed to create an enhanced environment for brainstorming, focus group work, and group decision making. (Townsend, 1995) Some examples of GroupWare available today include: Lotus Notes, Team Talk, Microsoft Exchange, Groupwise, Eclipse, Collabra, and Share.

These collaborative software systems also provide a comprehensive environment for group work. For example, Lotus Notes is designed specifically for asynchronous teamwork (e.g., communication and data sharing where parties are working either at different times or independently). It combines scheduling, electronic messaging, and document and data sharing into one common product. Townsend observes that:

> By combining a number of collaborative applications and communications systems into an integrated framework, products like Lotus Notes facilitate both the production and communication necessary to effective teamwork. (Townsend, 1995)

The Internet and Intranets : The Internet and intranets provide vast mediums of powerful communication tools. They facilitate the exchange of information through interconnective technology that supports the use of web pages and electronic bulletin boards, and provides remote access to existing systems like corporate databases. For the virtual team, the Internet and intranets provide important communicative and informational resources. With this technology, virtual team members can supply and access data using a variety of hardware and operating system configurations.

An intranet is an internet for a company versus the world. Many organizations are discovering the great power of internal interconnectedness. Companies like the Space and Warfare Systems Command (SPAWAR) use internal web pages to post everything from maps of various command locations, to the latest on the implementation of the Standard Procurement System (SPS). Townsend states:

> Intranets provide organizations the advantage of using Internet technology to disseminate organizational information and enhance interemployee communication, while still maintaining system security. (Townsend, 1995)

For the virtual team, the Internet and intranets provide an important communicative and informational resource. As Fisher notes:

> These systems allow companies to increase information sharing, provide electronic forums for problem solving, and post company wide policy and information in a user-friendly format. (Fisher,1992)

Unlike other components of the virtual team communication infrastructure, the Internet and intranets help bridge the gap between office-based employees and remote employees by providing identical service and data regardless of location. In other words, the remote member of the virtual team is not at an information disadvantage when companies effectively use the Internet and intranets. Townsend observes that:

> Taken together, face-to-face meetings, phone and voice mail, DVCS, collaborative software applications, and Internet/intranet technologies form an informational infrastructure within which virtual teams can match or even surpass the effectiveness of face-to-face teams. (Townsend, 1995)

Yet, having these tools is not enough. To work effectively across boundaries, virtual teams must not only become experts in the use of communication media and information exchange, but must also recognize that their communication approach must be

tailored and adapted to fit specific project needs. A "one-size–fits-all" approach does not support the variety of work tasks undertaken within each unique team.

H. CHAPTER SUMMARY

This chapter provides an overview of the changing business climate that has given rise to the idea and use of virtual teams as a competitive business process advantage. It includes background on both traditional and virtual teams and summarizes the basic characteristics that are essential building blocks for the conception and management of virtual teams. The overall intent of virtual teams is for competency-dispersed organizations to realize teamwork advantages and capitalize on telecommunication and information technology competitive advantages. The remainder of the chapter described communications and information sharing within a virtual team environment and summarized the technology in the workplace that enables the successful application of virtual teams.

III. AMERICAN MANAGEMENT SYSTEMS, INC. CASE STUDY OVERVIEW

A. CHAPTER INTRODUCTION

1. Research Focus

American Management Systems, Incorporated is a highly successful, high-technology, consulting firm with an extremely varied customer and product base that has experienced continuous growth over the last 27 years. AMS has been described as:

> ... the 13th largest consulting firm in the world—with good reason. [AMS] has experienced 27 consecutive years of growth, averaging about 20% per year. Revenues for 1997 were $812 million. AMS's goal is to be a one billion-dollar company in 1998. (AMS Internet)

In addition to being a fast-growing company, AMS has also been recognized as a great place to work by *FORUNE, Computer World*, and *Working Mother* Magazines.

> *FORTUNE* magazine recently placed AMS 30th on its list of "Best Places to Work For" in America. *Computerworld* magazine placed AMS 11th on their "100 Best" list. And *Working Mother* magazine recognized their flexible work environment and innovative culture by recently placing AMS on its "100 Best" list for the fourth consecutive year. (AMS Internet)

This case study investigates how the AMS corporation uses virtual teams to achieve its business objectives and support its overall corporate strategy. The intent of the study is to explore the application of virtual teams in a real-life information technology firm and observe how various virtual team theories and approaches are applied.

In their book, *Understanding the Virtual Office,* Norton and Smith state that there are trends to describe how virtual organizations of the future will develop. Specifically, they state that:

- Organizational structures will be horizontal rather than hierarchical; transient rather than static.
- There will be more team-working, particularly of cross-functional, cross-organizational nature.
- Individuals will be more mobile both within and between organizations.
- There will be a greater use of tele-computing and other forms of flexible working, made possible by advances in computing and telecommunications.
- There will be greater cooperation between companies to win access to new markets.
- Business will concentrate on what they are best at, and outsource the rest.
- Organizations will become skilled at learning and adapting to sustain a competitive. (Norton & Smith, 1997)

AMS was chosen for this case study because it currently mirrors the organizational characteristics that Norton and Smith identified above. AMS's culture, organizational structure, and management approach provide an environment capable of supporting virtual teams. In addition, many AMS employees have experience implementing or participating on virtual project teams. Their experiences and challenges are documented throughout the case study.

This chapter, provides an overview of the AMS corporation and describes why AMS is using virtual teams today. In addition, this chapter looks at how AMS uses virtual teams, in general, to support its corporate functions like human resources, training, and financial management. Chapter four will continue exploring AMS's use of virtual teams

by looking in depth at how virtual teams are being employed to support AMS's Standard Procurement System (SPS) project.

2. Research Approach

Information for this case study was collected by interviewing AMS employees and virtual team members. The interviews were conducted between January 1998 and October 1998. There were three types of interviews: (1) face to face interviews; (2) telephone interviews; and (3) interviews conducted by electronic mail. See the Appendix for interview questions. Each interview consisted of 10 major questions plus additional questions where amplification or clarification was required. Each respondent was assured of anonymity.

B. AMS BACKGROUND

1. Corporate Mission

A corporate mission statement is an essential building block providing the foundation on which a company approaches and shapes its overall strategy and organizational structure. AMS [1997] defines its corporate mission as:

> To share knowledge and experience in AMS's core disciplines, to increase the effectiveness of AMS client teams, and help our clients achieve breakthrough performance. (AMS Internet)

AMS provides a full range of consulting services to a diverse client base. Services range from defining client business strategies to implementing high-tech automated solutions for optimizing business processes. AMS employees apply visionary yet practical strategies to provide the catalyst for helping clients achieve their strategic performance goals.

AMS helps clients achieve their goals by first, providing consulting expertise in various client industries; second, applying the power of information technology to provide optimal business solutions; and lastly, building strong, long-term client relationships that are based on a commitment to achieve common goals. AMS takes an intelligent approach to projects by linking people, processes, organizations, and technology to achieve breakthrough performance for each client. In short, AMS assists clients by building upon their successes and preparing them for changes in a dynamic, competitive global marketplace.

2. Corporate Strategy

AMS's corporate strategy targets client satisfaction, employee development, and corporate values. AMS's strategy is based on three fundamental principles: first, building long term client relationships; second, building an empowered workforce that represents their corporate knowledge base; and thirdly, providing an organizational structure that is flexible and dynamic enough to be responsive to the needs of external clients as well as AMS's employees. This philosophy translates to a progressive workplace with no barriers to success. It also means that teamwork, technical innovation, and achieving a work/life balance play a big part in the lives of AMS employees.

3. Customer Base

AMS supports a broad client base with over 2000 clients worldwide. AMS works in diverse industries including telecommunications, healthcare, finance, insurance, pharmaceuticals, and electric and gas utilities. Colleges and universities, state and local governments, environmental organizations, and federal agencies also are critical practice areas within AMS. (AMS Internet)

This large, diverse client base directly impacts AMS's organizational design. AMS must not only provide an overlaying corporate structure that promotes core values and leverages knowledge, but also allow flexibility within the organizational structure to meet the specific needs of various clients.

4. Product Definition

AMS provides a broad range of products and services that fall into three basic categories: consulting services, business process reengineering, and information technology (IT) support and development. (AMS Interview, 1998)

Because of the varied customer base, products within these categories vary significantly. Currently, AMS is providing a next-generation custom care billing solution to Germany's largest telecommunication company, Mannesman Arcor. In addition, AMS is the prime contractor on the Standard Procurement System (SPS) being implemented DoD-wide. AMS is also working with Alabama's Department of Human Resources (DHR) to build a system called ASSIST to provide support services for welfare and adult protective services. (AMS Internet)

It is easy to see how diverse AMS is on both a client and product level. Each project varies in size, geography, product design, and delivery. In addition, AMS must be sensitive to the culture and customs of the varied communities ranging from military and commercial clients to local and foreign governments. All of these factors play a major role in the organization and design of AMS's corporate structure.

5. Organizational Design

To support its varied customer base, AMS has implemented a cellular organization that encompasses the idea of a "virtual office" populated with members of virtual teams.

A virtual office is an organizational design that is not restricted by geographic location. Resources are linked from across the globe to create dynamic, virtual project teams designed to meet specific client needs.

C. VIRTUAL TEAM EXPERIENCE

1. Why Virtual Teams?

To more effectively manage global human resources and staff knowledge, AMS has engaged work teams from multiple geographic sites. As indicated earlier, increased globalization of business, growth of communications technology, and competitive pressure on product cycle times have contributed to dispersed projects and, consequently, the use of virtual teams.

While employing virtual teams can be difficult, this structure offers AMS clear advantages. These benefits include:

- Human resources, skills, and technical expertise are distributed among national and international offices. Enlisting teams from across these multiple sites leverages the resources of each location allowing each project to be staffed with the best skill set mix regardless of employee location.
- As competition forces shorter development schedules, some benefits are derived from the longer workday available as development teams work in different time zones. This is especially useful during product testing and debugging cycles.
- Virtual teams provide a reduction in the costs of office floor space as virtual team members explore alternate work environments like telecommuting.
- Virtual teams provide better utilization of resources as client demands constantly change. The use of virtual teams help minimize overhead charges as projects scale down by allowing remote employees to transition easily from one project to another without physical relocation. (AMS Interview, 1998)

The pressures of maintaining competitive advantages in the marketplace have given AMS little choice but to pursue new strategies in reengineering their approach to work, business processes, people skills, and technologies. Being able to take advantage of the above benefits makes the use of virtual teams essential. Virtual teams provide AMS a business process approach that allows for a new level of capability. A virtual team approach is clearly the logical organizational design response. AMS's structure choice provides the organizational design that enables the optimum teaming of world-class competencies necessary to maintain a leading edge in their industry.

2. Where is AMS Using Virtual Teams?

AMS has over 40 offices scattered across North America and Europe and is growing each year. Figure 1.4 shows some locations. These offices range in size from 1000+ people at corporate headquarters in Fairfax, Virginia, to 30 people at the satellite office in San Diego. AMS's staff is geographically dispersed to service its geographically dispersed client base. AMS has used virtual teams to unite knowledge experts who previously were separated by these geographic boundaries. By linking together employees with shared goals, AMS has been able to optimize many common functions while maintaining consistency from site to site. Virtual teams have been established to optimize areas like human resources, travel, and the Learning & Professional Development Center (L&PD). The teams are comprised of knowledge experts from across the nation. Each contributes a unique point of view and acts as that region's representative. The use of virtual teams in this manner has allowed AMS to develop a corporate culture that is consistent across geographic boundaries while creating a collaborative environment where employees can contribute regardless of location.

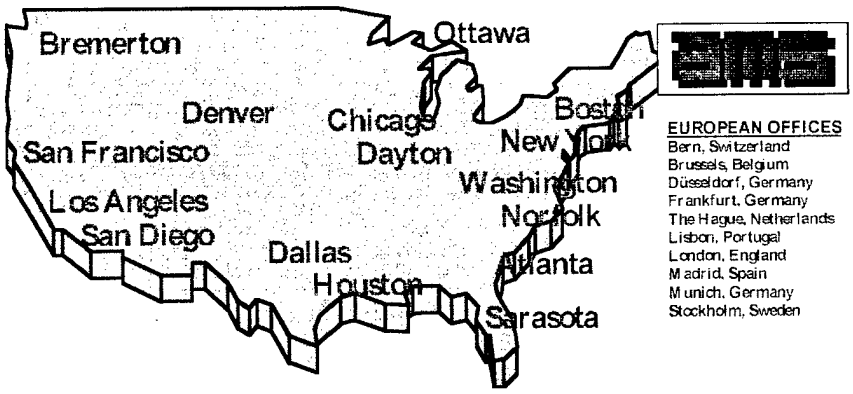


Figure 3.1, AMS Office Locations (AMS Employee)

In addition to using virtual teams to support corporate functions, AMS uses virtual teams to support many of its consulting projects. The need for resource flexibility and specific skill sets make virtual teams a good solution for these projects. AMS is using virtual teams to support projects like the Standard Procurement System (SPS) and Baseline Advanced Industrial Management (BAIM).

While the use of virtual teams continues to increase, AMS managers admit that they are still learning how to achieve the most from this new team structure. Chapter IV will explore AMS's use of virtual teams in more detail. It will look at the success and challenges faced by virtual team managers and members, and will analyze the critical elements for success.

IV. AMERICAN MANAGEMENT SYSTEMS, INC. CASE STUDY

A. CHAPTER INTRODUCTION

This chapter contains a compilation of virtual team applications, practices, and experiences applied across AMS's various business units. Because AMS is a large corporation with a highly varied customer and product base, the application of virtual teams varies from project to project across business units. For specific examples of virtual team applications, this case study examines the use of virtual teams within the Standard Procurement System (SPS) project. The case study examines the following topics in detail:

- Virtual Team Development
- Virtual Team Tools
- Virtual Team Management
- Trust in Virtual Teams
- Culture and Virtual Teams
- Technical Infrastructure

Each topic will be explored on two levels. The first level will focus on general AMS practices in this area. It will describe best practices currently in use and summarize the corporate approach. The second level will provide a detailed example of how these topics are being addressed within the SPS project.

Ultimately, this chapter analyzes the characteristics critical for virtual team success from a project manager perspective, highlighting both virtual team development and

organizational infrastructure issues. In short, this chapter highlights the major, management-level issues that impact primarily on virtual team effectiveness.

B. STANDARD PROCUREMENT SYSTEM PROJECT BACKGROUND

In the mid-eighties, a government team was formed to define requirements for a DoD-wide Standard Procurement System. For the past ten years, requirements were refined and companies competed with their commercial off-the-shelf products (COTS) for the award. In June 1997, AMS was awarded the SPS contract supported by its Procurement–Desktop Defense (PD^2) product. Currently, PD^2 is being implemented throughout the DoD Acquisition community including Army, Navy, Airforce, and Marine Corps branches.

PD^2 is a Windows™ based product that supports all phases of the defense procurement process, from requirement definition and pre-award activities to award, administration, and close out. It automates the procurement process by providing a standard graphical user interface (GUI) and storing data in a relational database management system (RDBMS). PD^2 meets the several hundred requirements specified for the SPS system and, more importantly, provides a standard platform on which future enhancements can be made DoD-wide.

The AMS SPS team has grown dramatically over the last four years from a team of 20 people in 1994 to a staff of over 300 employees supporting a world-wide client base today. The SPS team supports a wide variety of functions including: product development, testing, customer support, interface support, technical writing, deployment, and training. In 1997, after winning the SPS award, AMS was challenged with finding

hundreds of skilled people to staff-up the project to full operating capacity. AMS managers knew the local District of Columbia (DC) metropolitan area could only produce a portion of the quality candidates needed. AMS chose to use virtual teams to allow geographic flexibility to select the best employee base to support the SPS project.

The SPS project uses a flat, horizontal matrix organizational structure to support the development and deployment of SPS (see Figure 4.1). Specialized functional teams like product development and training cross with the branch specific (Army, Navy, etc.) client engagement teams to provide the platform for client support. These large teams rely on a combination of traditional and virtual teams to support their needs.

C. VIRTUAL TEAM DEVELOPMENT

In a perfect world, companies would have a pool of skilled resources available immediately to staff all project needs. In the real world, AMS is constantly struggling to maintain the balance between available resources with billable resources. This is a particularly significant challenge to consulting firms like AMS that must respond to the ever-changing staffing requirements that go along with winning and loosing contract proposals. In addition to maintaining the right number of employees, AMS must continually seek and build trained resources to keep up with its 25 percent growth rate each year. These challenges all impact how AMS staffs projects and encourages the shift toward virtual teams.

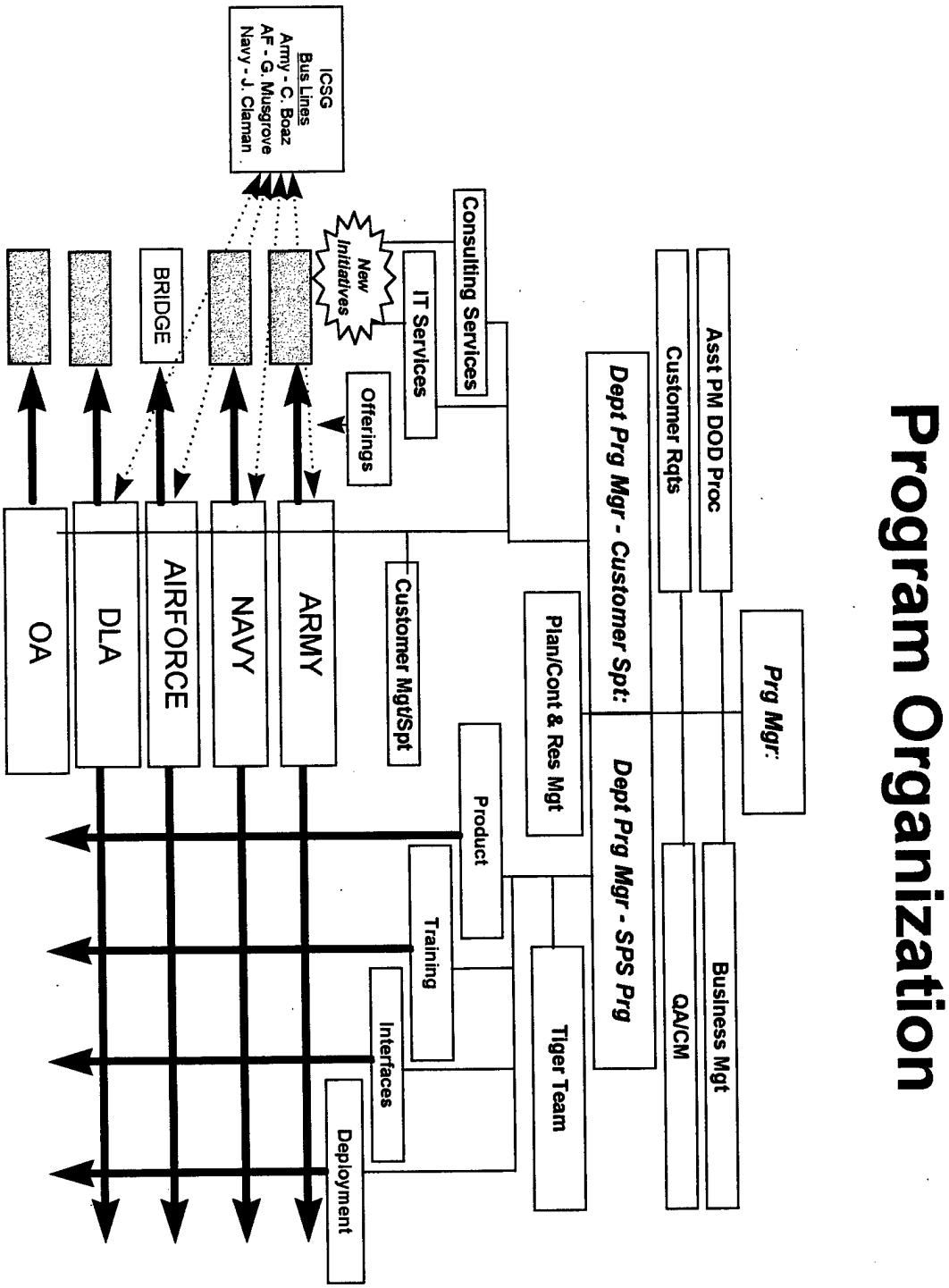


Figure 4.1, SPS Project Organization, from (AMS, 1998)

1. AMS Virtual Team Development

Most often, project team development is initially defined in the contract between the client and AMS. If the agreement is a level of effort contract, it usually specifies the number and skills sets (labor categories) required to support the project. If the contract is based on a firm fixed price, AMS alone develops the optimal skill mix to accomplish the project goals and achieve a target profit margin. In either case, the first step of project team creation is identifying the skills needed to accomplish the task.

At AMS, identifying the required project resources is much easier than acquiring these resources. AMS managers have a difficult time identifying available resources with the needed skill sets. Often one project would have a resource spike while another was wrapping up, but managers were unaware that the resources would become available or the resources were not considered candidates because of location. AMS turned to virtual teams as a way to expand the resource pool available to staff new projects and reduce the number of non-billable resources. AMS also recognized that it must provide a tool to managers to help them transition from looking for resources in their local workplaces to the idea that resources could be used from any AMS location. AMS developed the Area of Expertise Database to identify employees with specific skills that may be critical to a project. AMS managers can search the database for the skills required to staff a project and then identify possible team candidates.

Several managers interviewed indicated that while the Area of Expertise database provides a good starting place for virtual team members, it neglects to address the non-technical competencies that are key in forming a successful virtual team. Those who work productively without constant supervision can contribute most effectively to a project with

dispersed team members and management. Managers indicated that good communication and networking skills can be as important as technical skill qualifications for members of virtual teams.

Managers indicated that a virtual team environment is not for everyone. People who require a significant amount of structure have reported "feeling lost" in this type of environment. One manager sited an example where two new employees had joined her project supporting a Navy site in Jacksonville. Each had similar field experience and access to the same tools. One employee excelled in this environment; requesting information from other virtual team members via e-mail, voice mail, and phone calls; researching issues using the SPS knowledge base on Lotus Notes, and using AMS's internal Help Desk for troubleshooting. The other member was overwhelmed by the ever-increasing number of client questions that he was unable to answer. He was embarrassed that he could not supply the client with immediate responses. This member complained the he had not received enough formal training and was extremely uncomfortable using the tools available to him. Ultimately, the first member went on to be a successful project manager of his own virtual team and the latter member left AMS for a more traditional consulting firm.

For the right candidate, virtual teams can provide the freedom, flexibility, and challenge to maintain interest. One employee described the environment at AMS as "a playground for very smart people." When asked why, she said "where else do you get to work in your p.j.'s with your friends on the latest and greatest toys."

Virtual team membership is based on the core competencies needed to achieve the desired result. Individuals who possess the needed skills are recruited regardless of

standing or title within the company. In many cases, an employee's manager on one project may be his or her staff on the next. The bottom-line is that AMS's virtual teams are developed based on what skill sets best meet the project requirements. Because AMS employees want to be involved with the best and most interesting projects, the onus is put on them to continually build their abilities.

Employing people that fit the right "profile" is only part of how AMS builds successful virtual teams. At AMS, virtual teams are created for a specific purpose. The SPS Project is a good example of how AMS is using virtual teams to achieve project success. The SPS project uses virtual teams to support a wide variety of functions including:

- Product Deployment
- Customer Support
- Product Testing
- Financial Control

The following sections describe how virtual teams support these functions. Subsequent sections will refer to various issues and experiences encountered by these teams.

2. SPS Product Deployment Virtual Team

SPS is being deployed to 250 sites world-wide. The deployment team addresses the logistics of scheduling software installations and upgrades. In addition, this team handles any technical issues not relating to the PD^2 software product itself, but rather, to technical infrastructure.

This deployment team started off as one senior technical person. As product deployment increased, so did the need for additional technical team members.

Deployment work required some SPS product knowledge needed for installation and setup, client management skills, and a good understanding of PCs and networking. The SPS deployment manager had difficulty finding employees with strong PC skills and a working knowledge of networking. Fortunately, the Baseline Advanced Industrial Management (BAIM) project based out of Norfolk was downsizing and had technical resources available to support this effort. The home base of these employees was not a limiting factor since the majority of their job function was at client sites.

The current SPS deployment team consists of 20 permanent members; 10 located at the Fairfax office and 10 at the Norfolk office. Additionally, there are 10 cross-trained members who can be pulled from the customer support team for additional staffing during upgrade crunch times. While these twenty people are based out of offices less then 200 miles apart, team members are on client sites 60-80 percent of the time. Most often this team of twenty is scattered across three different time zones.

3. SPS Customer Support Virtual Team

SPS is currently operational at 120 sites. As this number increases, so does the need for customer support. The Customer Support Team (CST) is staffed by 106 AMS employees based out of the Fairfax, VA, Norfolk, VA., Seattle, WA, San Diego, CA, Jacksonville FL, and Philadelphia, PA offices. Some team members tele-commute from homes in California and Virginia. In addition, AMS has partnered with DSIC Incorporated who has provided 22 senior functional specialists. DSIC is the leading provider of government contracting services, with one of the country's largest groups specializing in contract management and procurement automation. DSIC has employees supporting SPS from its San Diego and Washington, D.C. offices.

Why has AMS assembled such a geographically disperse team that uses another companies services? The answer is simple:

1. The client is geographically dispersed. Regional versus centralized staffing to meet client needs offers many benefits. It reduces the cost of travel. It shortens the time AMS employees spend en-route, thus allowing them more time at the client site or at home with there family. And finally, it enhances communication options by locating the client support team and the client in the same time-zone.

2. The staff is selected for their expertise, not their geographic location. Staffing a large project can draw sub-standard candidates into an organization. By using virtual teams, AMS can examine their employee resources in many geographic areas and choose the candidates with the best fit.

3. AMS is a consulting firm whose strength is in business process reengineering and information technology. DSIC employees have years of Government contracting experience. Most DISC employees are ex-military contracting officers who understand the client's business and culture. The two companies partnered their strengths to build the project team that won the SPS contract. (AMS Interview, 1998)

4. SPS Product Development and Testing Team

The product team consists of 35 people located at the Fairfax office. When asked if a virtual team structure was considered for this team, the SPS IT manager stated:

> Current technology makes it more cost effective to keep some development teams on-site. While definitely possible, it was not the optimal solution....Product utilization via the internet is slow and getting dedicated bandwidth can be expensive. (AMS Interview, 1998)

The development team does use off-site users who act as a virtual test team to do functional testing of the software. For example, AMS has developed *AcquiLine*, a new web-based product suite that provides access to the SPS contracting system (called PD^2) through a Java-enabled web browser, WEB. Since *Acquiline* is a WEB-based product, it can be tested by anyone with access to the WEB and proper authority.

5. SPS Financial Management Virtual Team

The SPS project actually consists of many subprojects that are financed individually. Some projects are client specific, some are funded by the Project Management Office (PMO), and others like *Acquiline* are funded internally. Regardless of the source of the funds, each project has a project manager who is accountable for the profitability of the project. This project manager works with many areas within AMS to ensure that targeted direct contribution margins are met. Virtual team members and their specific roles are listed below:

- Contract Specialist – Reviews contract for legal sufficiency & profitability.
- Business Manager – Reviews contract language, terms and pricing structure for staffing requirements and profitability.
- Project Manager – Develops statement of work (SOW) with client, prepares proposal., determines staffing requirements, prepares project estimates, and monitors project profitability.
- Proposal Assistants – Assists in writing the proposal and providing estimates. These people are recruited to the team based on the proposal content and their specific area of expertise.
- Contract Administrator – Performs invoicing and manages the revenues.

There are over 20 SPS projects that are tracked as separate financial projects, and new work requests come in weekly. The financial management team described above does not even have a name, but it forms every time a SOW is delivered to AMS and continues until the contractual terms have been meet. The team is large at first, particularly during proposal development, but shrinks over time. Members communicate periodically to track status, complete project close-outs, and share lessons learned, but rarely if ever are these tasks conducted face-to-face.

D. VIRUTAL TEAM TOOLS

Virtual teams need special tools to replace the absence of face-to-face communication. AMS has attempted to create an environment that provides virtual team members with the right tools to do their jobs. These tools help make information and support services available to all employees regardless of location. AMS recognizes the importance associated with equitable access to informational and educational resources as an indication of management's commitment to each team and its work. The AMS virtual team tool set includes:

- The GroupWare software: Lotus Notes
- Voice mail
- Automated Software
- Video Teleconferencing (VTC)
- Mentoring
- Yearly titled staff retreats and quarterly project meetings

AMS virtual teams use all these tools to link members together and allow them to work as a team to accomplish their goals. The following sections examine the tools used to support AMS virtual teams and cite specific examples of how these tools are applied by the SPS virtual teams.

1. Lotus Notes GroupWare

The Lotus Notes GroupWare application forms the back bone of AMS's information repository. Three years ago, AMS switched its corporate mail system from CC: Mail to Lotus Notes for one very important reason: AMS needed more than a mail system for individual users to communicate with each other. AMS needed to build an

information repository that users could request information from. Lotus Notes allows information to be organized across customizable information databases.

The distinction between e-mail, which pushes information out to employees, and an information repository that allows information to be stored and later requested is an important one. Lotus Notes allows information like corporate policies and human resource policies to be stored electronically in a database that all AMS employees have access to regardless of location. Anytime an AMS employee has a question regarding benefits, s/he can access the Lotus Notes database on that topic 24 hours a day seven days a week. When the policy changes, it is changed on the central database and all users have access to the new modifications.

AMS uses Lotus Notes for far more than just a file cabinet for policy documents. Just about any published document, deliverable, or research done at AMS is posted to Notes. AMS has set up a Lotus Notes database called Knowledge Express to help manage what its considers intellectual capital. Knowledge Express acts like a table of contents to this intellectual capital, thus making it easily available to all Lotus Notes users. While much of the information is protected by AMS as intellectual property, Table 4.1 below describes some of the information accessible through Knowledge Express.

Knowledge Express	
Database Category	**Contents**
AMS Wide Databases: *Contains general information about AMS policies and employee services.*	• About AMS Offices • Guide for Ethical Business Conduct • On-line Benefits • AMS White Pages • AMS Yellow Pages • Employee Manual • The unofficial guide to… • Who knows about ?

Knowledge Express	
Database Category	**Contents**
AMS Center for Advanced Technology (AMSCAT) Databases *AMS describes AMSCAT as a global, virtual research enterprise with outreach to the entire AMS community.*	• AMSCAT Publications • Sybase R & D • *Various other AMSCAT R&D Topics*
Best Practices *AMS describes its best practices series as a collections of processes, tools, methods, and information that are derived directly from our consulting experience.*	• Best Practices Methodology • Best Practices Metrics • Best Practices Publications • Best Practices Examples
Knowledge Centers *AMS describes AMS Knowledge Centers as communities of AMSers across business units who have a special interest and expertise in one of AMSs core disciplines. The mission statement is:* *Communities of experts sharing and advancing knowledge and experience in AMS's core disciplines to increase the effectiveness of AMS client teams and help our clients achieve breakthrough performance.*	• Advanced Technologies • System Development and IT Management • Organization Development and Change Management • *Other AMS Special interest groups*

Table 4.1 Knowledge Express Contents, from (AMS Interview, 1998)

Lotus Notes is also used at the individual project level. The SPS project uses Notes to store lessons learned, client deliverables, release notes, and much more. The CST provides a good example of how Lotus Notes has been used to support a virtual team. A big challenge faced by the CST is sharing information with all its virtual team members. With typically over half of its staff working at client sites across the nation, it is hard to ensure that the latest information is being conveyed to all team members. Unlike other functional teams (deployment, product, training, etc.) that focus on one particular area of SPS, the CST requires information from across all functional areas of the SPS project. Clients want CST members to be the primary point of contact for all their issues.

At first, CST members would fire out e-mails and voice mails to get answers. But issues quickly surfaced with the use of this technique:

- Leads of the functional teams were swamped with the magnitude of questions from the on-site CST members. Often these questions were repetitive; members from the CST would ask similar questions from different sites.
- CST members were not learning from each other. Each member was trying to solve client problems independently because communication between CST members was not a priority, solving the clients problems were. This resulted in wasted time as CST members worked to solve problems that already had fixes.
- The CST provided different answers to the same problem at various client locations. It did not take long for the Navy clients to compare notes and discover the discrepancies. This reduced the credibility of the CST. (AMS Interview, 1998)

The solution was to develop a Lotus Notes database that would act as the SPS knowledge base. This knowledge base would provide information to all members of the CST. Users could search for the information to answer questions at the client site. In addition, users could post lessons learned and "work-arounds" they discovered from their client work. Table 4.2 describes some of the databases available to SPS team members. While these databases are managed by the various sub-teams, the information is available to all team members.

Managing Team	Lotus Notes Databases
General SPS Team	• Asset tracker • SPS Program Policies • Status Reports
Deployment Team	• Technical Assessment Site Surveys • Deployment Schedule • Deployment Status • Deployment Procedures

Managing Team	Lotus Notes Databases
Product Team	• Issue tracking, status and resolution • Product Release Notes • Interface Specifications • PD^2 Design Information
Customer Support Team	• Frequently asked questions (FAQs) on SPS • Client Deliverables by Site • CST status • Topic papers addressing client issues • User Group Minutes • Helpdesk Call Logs
Financial Management Team	• Project Reviews • Contract Status

Table 4.2 SPS Lotus Notes Databases

Ultimately the Lotus Notes SPS knowledge base provided the medium for the functional teams to communicate with the CST and for the CST to communicate with itself. The database allows functional team managers to relay a consistent message to all CST virtual team members quickly and effectively. The sharing of consistent, accurate information between the virtual team members and later to the client increased the credibility of the CST.

2. Voice Mail:

At the AMS Norfolk office, managers were given cell phones for Christmas so they could check there voice mail while sitting in morning rush hour traffic. This is only a small indication of the important role voice mail plays at AMS. In short, voice mail is the blood-line to all AMS employees. It connects all users regardless of location, time zone, or availability.

On the SPS CST, voice mail is used by managers to announce time-critical information. The Client Engagement Manager (CEM), who oversees the CST has created several voice mail groups that ease message distribution. Some of his voice mail groups

include: a group for all members of the CST, a group for project managers, and a group including all functional managers from the deployment, product, and financial teams. When asked why he created distribution lists the CEM replied:

> I received feedback from members of the CST that they did not feel like they knew what was going on back home when they were at the client sites. They indicated that sometimes the client knew more information than they did. That day, I created the distribution list. With these lists, I could easily send messages to the team. I use them for everything from announcing the latest contract award victories to giving a quick status of the latest software issue. Voice mail is a quick way to give everyone a heads-ups on the latest gouge. (AMS CEM Interview)

The CST uses voice mails daily to keep the virtual team connected. According to one CST virtual team member:

> Voice mail allows me to reach remote resources quickly when I have the question in my head. I don't have to see if they are in there office, or type up an e-mail and replicate my mail. I can just pick up the phone. I have been remote for almost five years now and have found using voice mail far more effective than the old walk around office and look for help method. (AMS Interview, 1998)

The CST virtual team managers agree that voice mail plays a key role in how they communicate with their virtual team members. They also agree that "unregulated" voice mails can get out of hand. On manager summarized:

> No one wants to wake up to the voice mail system saying "you have 63 unheard messages." Voice mail is supposed to be the next best thing to real-time communication. If you get so many voice mails that you can't respond to them, it defeats the purpose of voice mail in the first place. (AMS Interview, 1998)

Because of this, the CST has also developed some guidelines for effective voice mails. A summary is listed below (SPS Policies Lotus Notes Database):

- State who you are first. If the voice mail is to multiple people, start the message with "Hi this is Pete with a message to Joe, Jill, and Mary."
- State purpose in the beginning of message. Don't go into detail without first providing subject. For example, "SPAWAR is experiencing a show-stopping issue that needs to be resolved today. The problem involves ..."
- If the subject is very detailed, use the voice mail to refer recipients to a more detailed e-mail.
- Don't ramble; make specific requests of specific people.
- Use the extended absence greeting any time you are out of the office and will not be checking voice mail regularly.
- Check voice mail at least twice per day (AM and PM).
- Use urgent flag if the topic needs to be responded to immediately.
- Use the private flag to prevent messages from being forwarded.

With these guidelines in place, the CST enjoys the benefits voice mail has to offer without constant misuse.

3. Automated Software

One challenge faced by virtual teams is the complexity associated with doing typically simple tasks remotely. All AMS employees must keep track of their hours worked and expenses. Several times a month (exact schedule is dependent on project), team members must submit timesheets and travel vouchers to project managers who track financial status of the project. A CST team member described his biggest frustration with being on a virtual team. It was not related to the work itself but rather with the administrative tasks associated with the work. He stated:

> ...doing the work remotely was simple compared with trying to keep track of phone call expenses, Fed-exing paper timesheets, and getting supervisor signatures on vacation requests. All of these things were trivial to a local team member but would take hours of coordination for me. (AMS Interview, 1998)

AMS has recently made some changes to reduce the non-productive time virtual team members spend on administrative tasks. Recently, AMS deployed Timex, an electronic timesheet system that allows virtual team members to submit timesheets electronically via Lotus Notes. The signature feature on Notes eliminates the need for paper signatures. In addition, a new vouching system allows expenses incurred by virtual team members to be submitted electronically. By providing these tools, AMS sends a clear message of support to remote users and increases productivity.

Another automated system used by the SPS project is the *WOOF* system. *WOOF* is the Product Development Team's application for tracking issues with the PD^2 software. The task of resolving bugs in the deployed software is accomplished by a virtual team comprised of members from the CST on-site representatives, CST testers, Product team configuration management, Product Development team developers, and Deployment team. In addition, a configuration control board (CCB) is used to determine priorities and guide the overall product directions. Members of the CCB include the SPS Product manager and representatives from the Program Management Office (PMO) for the SPS program. Figure 4.2 describes the general sequence of events that occur when an issue is found.

As seen above, responsibility for issue resolution is shared across many teams located in a variety of places. How is this virtual team able to coordinate the exchange of information when the members change and move? The virtual team uses the *WOOF* software to manage issue tracking between members. *WOOF* is available to all SPS project team members via Lotus Notes, and non-sensitive information is available to the PMO via the WEB. Woof tracks over 100 detailed data items that fall into the following major groupings:

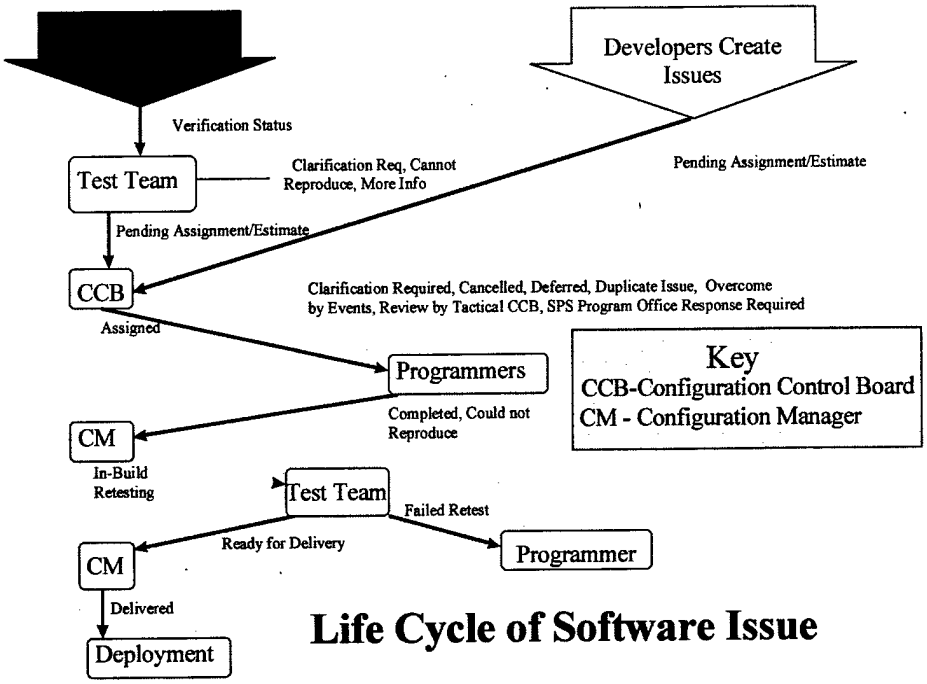


Figure 4.2, Life Cycle of a Software Issue, from (AMS Interview, 1998)

- General Information
- Resolution
- Schedule
- Configuration Control/Quality Assurance
- Financial
- History

The *WOOF* software effectively allows all members of the issue resolution virtual team to see the real-time status of the issue. The CST relies on *WOOF* to address all software defect issues. One problem encountered by the CST was the inaccuracy of the data in the WOOF system. Many times, the data in WOOF were not kept up to date with changes that occurred at the CCB, and therefore reflected inaccurate status. When the on-

site CST team members discovered the data were inaccurate, they began requesting updates on specific issues from the Product manager via voice mail and e-mail. After a few weeks of being inundated with CST issue updates, the product manager changed the CCB meeting location to a place where he could update *WOOF* during the meeting to ensure accuracy.

Ultimately, automated software products allow the virtual teams, like the issue resolution team in SPS, a medium to exchange information between users who are not co-located. Automated software is only as good as the data it collects and maintains. Once a product is labeled inaccurate, virtual team members will look for other avenues to obtain the information they need.

4. Video Tele-Conferencing (VTC)

It is surprising that a company as large as AMS uses VTC technology so infrequently. During all interviews, AMS managers reported VTCs were used rarely, if ever, to support virtual teams. Most managers sited the cost (approximately $100.00 an hour), availability, and the inconsistent reliability of the connection as the reasons why this technology was seldom used. Many managers indicated a desire to use VTCs once the technology became less expensive and provided a more real-time environment.

Like the parent company, the SPS project does not use VTCs frequently to support virtual teams. SPS mangers indicated VTC equipment availability was limited and difficult to acquire. However, VTCs were used at government client sites using the PD^2 software like the SPAWAR claimancy. The SPAWAR claimancy consists of sites located in Charleston, SC, Alexandria, VA, and San Diego, CA. These sites act as a virtual team consisting of government representatives from the three sites and a CST project manager.

The goal of the virtual team is to ensure the SPAWAR claimancy is fully operational using SPS by June 1999.

VTC were used primarily because the government sites had access to state-of-the-art VTC facilities that allowed three-way conferencing with multiple video displays. The virtual team used VTCs over the past year to:

- Conduct product customization focus groups
- Review claimancy status
- Develop standard operating procedures

The team's evaluation of the benefits of VTCs were mixed. Team members liked being able to see each other's expressions and body language. Members felt these visual cues helped meeting flow more smoothly. Members also liked using VTCs because it was "cool" to be using the latest technology. But, members also listed many negatives of VTC use: (AMS Interview, 1998)

- Connections failed frequently and often a significant amount of meeting time was spent reestablishing the connections.
- VTC video jumped from one person to the next too quickly and caused delays as the team waited for video to return to the person speaking. Video quality was low, making it difficult to see expressions.
- Voice was often muffled because quality of speaker phones was low or location was too far from speaker. Feedback problems also occurred when speaker phone was placed too close to the video monitor. Time was wasted with continuous "Can you hear me know? How's this? ..."
- Presenters were uncertain how to present information. Often, presenters incorrectly thought because the remote team members could see them, they could see what they were pointing to in a document or presentation. The video quality was not good enough to pick up this detail.

- Meetings were structured around VTC available time slots. A one-hour slot cut the meeting off after one hour regardless of whether the meeting agenda was complete.

Ultimately, the SPAWAR team replaced VTCs with conference calls because phone conferencing offered more flexibility. One team member described that reason for the change as:

> I think we all just got to the point were we knew each other well enough that the video was no longer needed. I didn't need to see Jan's face to know when she was hesitant about something. I could tell in her voice or she would just stop me and tell me what was on her mind. Sure, there are still times when I'd love to see their faces to get a read on how they feel, but once trust and a sense of teamwork is established, this is less important. (AMS Interview, 1998)

Because of availability, quality of transmissions, dependability, and cost, the SPS project seldom uses VTCs. Their use will be investigated in the future when these issues are remedied.

5. Mentoring

AMS uses mentoring as a way to support virtual team members. The AMS mentor program is designed to assist all AMS employees (remote and local) with career planning, issue resolution, and personal development. While the mentor program is recommended in AMS Best Practices for Project Management, it is up to each business unit and project team to determine if and how the program is used.

The SPS project considers the mentor program as an essential part of their employee development strategy. The mentor program was adopted in January 1998 when many members of the CST were expressing dissatisfaction because of a lack of individual attention. The CST had become so large and dispersed that managers were struggling with staffing all commitments. Each experienced team member was so valuable that they

were often utilized over 100 percent (over 40 hrs a week). As a result of this resource crunch, team members felt that their managers were more interested in keeping them in their current role, because of their unique skill or experience, than finding new challenges to promote their careers.

In addition, virtual team members reported feeling like they were getting lost in the flat organizational structure. They were no longer sure who their boss was and who was looking out for their interests. For example, an CST team member was working on two virtual teams: the Acquiline team dedicated to developing a new SPS add-on product and the "Tiger" team in charge of troubleshooting unique client issues. Both of these virtual teams consisted of cross-functional members pulled from all the SPS project teams. The Acquiline team was led by a member of the Product Development team and the Tiger team was led by a senior manager not belonging to any of the defined SPS teams. While this employee was recognized throughout the SPS project for being an excellent contributor, she expressed concern over her future career opportunities since she no longer worked with senior managers of her primary team, the CST.

The mentor program enables SPS virtual team members to get the support they need to define long-term career goals. The SPS mentor program assigns a mentor to each employee. The primary guidance used in assigning a mentor was that s/he not contribute to the employee's annual review. The goal was to allow the employee to have a mentor that she could speak freely with about the direction she wanted to take her career. Employees and their mentors meet quarterly via phone, or as requested, to discuss personal goals, career direction, frustrations, or any other questions they may have. The mentor provides the employee with assistance in setting short-term goals to reach long-

term objectives. In addition, the mentor helps the employee identify opportunities to accomplish short-term goals.

In the SPS virtual team environment, the mentor program helps virtual team members define their career objectives. But, even more importantly, the mentor program helps connect virtual team members back to AMS as a corporation. Virtual team members are often so tied to the current project that they have little interaction outside of it. The SPS mentor program helps virtual team members understand they are an important part of the team and, more importantly, they are a part of the larger AMS system.

6. Yearly Titled Staff Meetings and Quarterly Project Meetings

AMS senior management believes that an organization made up of virtual teams still needs face-to-face meetings to keep the company aligned with its mission and maintain a culture that values its employees. AMS holds yearly off-site retreats for titled staff in a particular business unit. Titled staff are all members of AMS who have been promoted to one of AMS's promotion levels. The table below describes the promotion levels within AMS.

Promotion Title	General Responsibilities
Principal	• Responsible for small project teams up to 10 people • May lead a sub-task within a larger project. For example, Project Manager for SPAWAR under SPS
Senior Principal	• Manages larger project teams like the CST, Product Team, or Deployment Team with in SPS
Vice President	• Manages large projects like SPS
Senior Vice President	• Manages Responsibility Centers under each Business Unit
President	• Manages Business Units like Defense, State Governments, Tele-communications, etc.

Table 4.3 AMS Promotion Levels, from (AMS Interview 1998)

While this is a costly endeavor, senior managers recognize the importance of bringing its future leaders together. These meetings outline AMS's goals and how each person at AMS contributes to reaching these goals.

In addition to the yearly business unit meeting for titled staff, individual project teams, like SPS, also schedule conferences to bring virtual team members together. The SPS CRT team conducts a quarterly conference where all members of the virtual team convene in Fairfax, VA. At these meetings, each SPS team--product, training, interfaces, testing, and deployment--present and exchange information about activities within their team. In addition to the formal presentations, team members can sign up for various special interest groups (SIG) to learn about a particular topic of interest to them or the client they support.. A beneficial side-effect of these meetings is the face-to-face interaction among virtual team members who can now reconfirm introductions with a handshake. It is not unusual for members of a virtual team to go out for a team dinner during this week-long conference. This allows the team members to interact on a more personal level.

E. VIRTUAL TEAM MANAGEMENT

As AMS expands globally and multiculturalism becomes a norm, distance leadership will increasingly become a factor in most teams and organizations. What differentiates traditional team leadership from virtual team leadership? What skills must the present-day, technologically astute leader possess that will allow him to exploit the surrounding virtual work environment?

Observations of AMS virtual teams highlighted the fact that many characteristics of virtual team leadership do not differ significantly from traditional team leadership. Clarity of vision, communication, instilling ownership, and sensitivity to followers are always essential. There are, however, differences. More than anything else, successful leaders of a virtual teams demand clear, ongoing communication—from an operational standpoint and as a means of fostering community among geographically distant team members.

According to all AMS managers interviewed, communication was the most important factor in determining the success of managing their dispersed teams. SPS virtual team managers have been taught to view communication as something that must be designed in order to be effective. The level of success SPS managers have in communicating information to their virtual teams is directly related to their ability to adopt the view that communication is considered work, not a natural occurrence.

Discussions with one SPS team manager identified how the SPS project is taking the job of communication seriously. He described how over the past year the SPS team focus has shifted from "a team dedicated to working hard to a team dedicated to working smarter." (AMS Interview, 1998) Prior to the 1997 SPS contract award, the SPS team was totally absorbed in meeting the aggressive schedule to stay competitive for the 250 million dollar contract. Meeting the contract requirements took priority over everything including documentation and communication. The team was small and local so there were few negative impacts felt by the informal communication structure.

By the end of 1997, however, the impacts of the unstructured communication strategy were apparent. The 500 percent project staffing increase and the introduction of

virtual teams forced a change. SPS managers developed a communication strategy that targeted three key areas: first, they developed a matrix organization as described previously in figure 4.1; second, they initiated development of the SPS Knowledge Center on Lotus Notes; and third, they initiated a collection of information-sharing activities that they called the communication exchange. Each component is described in Table 4.4.

Communication Strategy Component	Description
Matrix Organization	• Structured to promote communication across functional teams, especially between functional teams and CST.
SPS Knowledge Center	• Lotus Notes database repository for lessons learned, FAQs, templates, and deliverables all pertaining to SPS
Communication Exchange	• Weekly Status Reports from each functional team and CST team • Monthly Customer Support Team Meetings • Project Reviews Every Six Weeks • Quarterly CST Conferences

Table 4.4, SPS Project Team's Communication Strategy, from (AMS Interview, 1998)

With this strategy in place, SPS managers are able to more effectively communicate with virtual team members.

In addition to communication, SPS managers identified two other areas that play a key role in successful virtual team management. The areas include:

- Begin as a Team
- Present a Unified Strategy

These areas are explored in the paragraphs below.

Begin as a Team: SPS virtual team managers credit kick-off meetings as "setting the stage" for a successful project. One manager indicated that bringing team members

together from all sites at the beginning of a project for face-to-face interaction promoted team unity and gave team members a chance to get to know one another. Another manager working with teams spread between a client site and an AMS office said she sponsored a meeting for all developers in one location before the project began because she believes such interaction formalizes commitment and establishes credibility. Yet, another SPS manager suggested using an agenda for such meetings that includes a collaborative assignment with a deadline to engage team members in a situation that requires cooperation and bonding. In general, most SPS managers interviewed felt informal social gatherings benefited the team by allowing team members to get to know others with whom they will be communicating later across remote sites.

Present a Unified Strategy: A common theme among the managers interviewed was the idea that the team is not formed when team member's names are put on a list, but rather when the team understands its purpose. One manager interviewed stated that virtual team success depends on the manager's ability to outline goals for the project and strategies the team will use to achieve them. He went on to state:

> How the team will function is important for all team members to understand. Kick-off meetings should include a purpose statement that defines the project's scope as well as what is beyond scope, what communication technologies will be used, and what the project's success criteria will be. (AMS Interview, 1998)

In addition, most managers indicated that establishing expectations for conflict resolution, organization and scheduling, and communication processes were also helpful. For example, some teams came up with formal agreements on how often each member should check the database for updates. Other teams appointed one member as a team facilitator to monitor team interaction and ensure everyone maintained focus on the agreed

goals. One SPS CST manager recommended assigning a management liaison to each site to synchronize project administration responsibilities.

F. CULTURE AND VIRTUAL TEAMS

This section, in two parts, will carefully study how AMS's conscious use of corporate culture develops virtual team employees with an unparalleled commitment to the company's success. "At AMS, our culture encourages and rewards information sharing....our people and our values are at the core of everything we do." (AMS Internet) The first part defines culture and looks at how cultural creating mechanisms are integrated into the organizational structure. The second portion shows how culture is developed through the use of motivation and rewards and maintained by feedback mechanisms.

1. What Is Culture?

Culture is understood to be a social control system used to coordinate activities and shape behavior into a set of patterns, beliefs, and expectations shared by its members. These patterns produce norms that are capable of powerfully shaping behavior within a group. (O'Reilly, 1989) At the organization level, these norms have been referred to as what Beyer and Trice call "corporate culture" and play a significant role in shaping many successful organizations throughout the world. (J. Beyer & H. Trice, 1987)

Although corporate culture is often taken for granted by managers in many organizations, it is a deliberately created set of understandings, norms, and values that are conveyed directly or tacitly to the organization's members for the purpose of achieving a corporate strategy. (J. Beyer & H. Trice, 1987) The benefits of creating a corporate culture to steer behavior, guide norms, and motivate employees are well understood at

AMS. It doesn't take long to see that AMS's organizational culture is designed to promote its business strategy, "Delivering Value to Our Clients." (AMS Internet) By linking AMS business strategy to its cultural values, AMS has successfully increased employee commitment and fostered the innovative business practices that have given it a competitive edge over its competition.

2. Developing the AMS Culture

a. Elements that drive the AMS Culture

To understand the culture at AMS, one must first study the nature of their business and the corporate strategy used to achieve AMS's business goals. As indicated in Chapter III, AMS prides itself as being one of the premiere high-technology consulting firms in the world. The organization employs thousands of people throughout the world performing a variety of seemingly complex tasks. Although the scope of the work varies tremendously, AMS is able to maintain an underlying company philosophy that promotes innovation and the continual growth of knowledge—two common elements within the high-technology industry. This philosophy is motivated by the extremely competitive nature of that business environment. It places a strong emphasis on developing human capital and the willingness to take substantial risks in a calculated trade-off to promote new innovative growth.

In the case of virtual teams, culture encapsulates the team and strengthens its internal components. Figure 4.3 shows that virtual teams are comprised of three major components: its team members, the communication infrastructure, and the team's purpose.

Culture and Virtual Teams

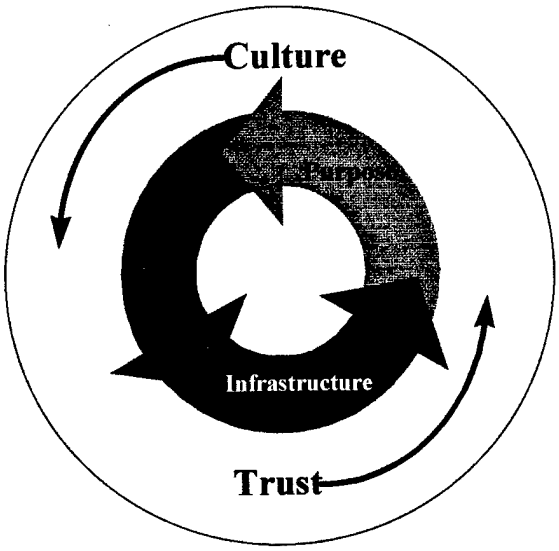


Figure 4.3, Culture and Virtual Teams

While these three elements allow a virtual team to function, it is the culture that helps define the context of the environment in which the team performs. Corporate culture helps define team members' expectations of themselves, each other, and the external organization. At AMS, employees refer to certain qualities as belonging to an "AMSer." Some of these qualities, including resourcefulness, flexibility, and self motivation, have become deeply rooted in the AMS culture and set a common expectation of what one AMS employee should expect from an other. It is through careful development of these types of cultural norms that AMS incorporates its value system into each employee.

While culture is important to employees, virtual teams rely heavily on various cultural norms to define how they will function. For instance, at AMS one cultural norm is using other AMS employees as informational resources. If an employee is an expert in a

particular area, s/he expects (and the company expects) to share this knowledge with others, especially those who request the information. Because this is part of the AMS culture, virtual teams can request services from across the organization as needed. If, on the other hand, the culture supported a more hierarchical structure where information was closely guarded, the team would have to develop another strategy for information access. It is easy to see how various cultural norms either promote or discourage the use of virtual teams.

Virtual teams experience culture by interacting with the organization. In the past, team members may have traveled to client sites or have worked on remote projects, but typically each would eventually come back to "home base" to receive a dose of corporate culture. But now many virtual team members seldom if ever return to "the mothership." Indeed, companies are struggling with the question of how they will spread their culture to a new work force based at satellite offices, client sites, and home offices across the country.

AMS uses two methods to help spread its desired culture. First, AMS uses Lotus Notes to post information about who they are and what they stand for. In addition, the Lotus Notes databases are proof that managers support a culture committed to information sharing. The Lotus Notes database provides a passive way for virtual team members to reach out and learn about their environment.

Culture is spread much quicker though active mechanisms. By instilling the company's core values it its titled staff employees[1], AMS uses them to act as a positive

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[1] See Chapter IV section D.6 for a detailed description of titled staff

culture-spreading army. AMS teaches its titled staff about its culture during the yearly titled staff retreats when they discuss where the company is and where it going. AMS holds each titled staff member accountable for making AMS a great place to work. Culture is spread as each titled staff employee interacts with other employees in a way that is consistent with AMS's core values. Because virtual team members either are titled staff or work with titled staff, they experience these core values through their interactions with the project team members, supervisors, and mentors.

b. Cellular Structure

AMS calls itself a "high performance organization." This type of organizational structure has been referred to as a network structure, or what Mintzberg describes as an adhocracy organization, and more recently referred to as a "cellular organization." (Mintzberg, 1992) Cellular organizations are relatively new to corporate America. They were born out of the need for companies to expand their know-how and resource utilization that were limited under older corporate structures. The word "cellular" is a metaphor that suggests pockets of living, independent, and dynamic organisms that can act alone to meet their needs or act together to perform more complex tasks. Acting together, the cells transfer of knowledge creates a "higher-order organism." This combination of independence and interdependence allows the cellular form to generate and share the know-how that produces continuous innovation, requiring the cooperative efforts of many specialized experts. (Miles, 1997) We see this type of organization being commonly used in the high technology industries because it leads to innovative practices. To survive in this rapidly changing environment, these firms have

little choice but to combine the resources of their employees' knowledge, share it, and use it to develop new innovations to stay ahead of the competition.

The cellular organizational structure reinforces and fosters independent yet cooperative work practices and places the greatest emphasis on knowledge as opposed to hierarchical status within the company. AMS's choice of a cellular form organization directly affirms the important role culture plays in an organization's strategic business design. At AMS, the use of a cellular organization is reflected in its corporate profile: "Our people and our values are at the core of everything we do. This philosophy translates to a progressive workplace with no barriers to success at any level." (AMS Internet)

c. Job Design/Fit

At the heart of AMS's culture and corporate success is their unique job design and job fit. AMS seeks to align itself with its environment and to arrange resources internally in support of that alignment. In practical terms, the basic alignment mechanism is strategy, and the internal arrangements are organizing structure and corporate culture. The strategy leads to the structure, which gives rise to identifying people's needs and aligning those needs to the tasks. (Mintzberg, 1992) Following a pattern of aligning tasks, corporate strategy, and employee needs, the corporate culture is developed.

At AMS, as with an adhocracy, the most complex organizations engage sophisticated specialists (experts), especially in their support staffs, and require them to combine their efforts in project teams coordinated by mutual alignment. This results in the adhocracy configuration, in which line and staff as well as a number of other distinctions tend to break down. The managers of an adhocracy do not control in the conventional

sense of direct supervision. Typically, they are experts also, who take their place alongside the others in teams, concerned especially with linking the different teams together. AMS virtual project teams are designed and permitted to operate independently in an autonomous nature with minimal corporate guidance. The AMS virtual teams are provided nearly unlimited resources and are given the freedom and professional latitude to accomplish team goals. Project managers carefully pick and choose their staff with particular skill sets from the corporate pool of personnel. AMS employees maintain a wide base of expertise so as to not constrain them in one particular job role.

AMS's culture supports employees learning new skills by working on projects beyond one's own area of expertise. However, the emphasis is to match the technical requirements of the job to the AMS "expert." This process ignores the traditional hierarchy of more conventional organizations. According to one AMS employee, "On one project I was in charge and had a coworker reporting to me. I was ultimately responsible. On another project I was reporting to him, and yet on another project we were both working together reporting to somebody else." (AMS Interview, 1998) Operating in this fashion aligns the job role (subject matter experts) with the project task regardless of traditional hierarchy status limitations.

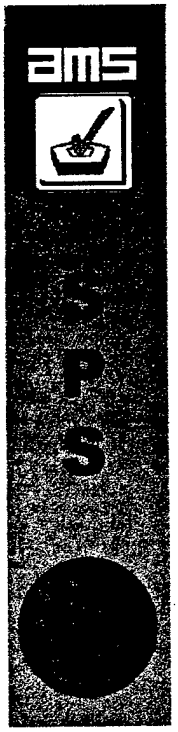
3. Motivation and Rewards

There are two elements used within AMS's organization to motivate and reward behavior within virtual teams. These elements are entrepreneurship and member ownership. These factors are strategically used at AMS to create employee participation, job ownership, and employee commitment. These factors invariably contribute to the cultural norms AMS encourages.

a. Entrepreneurship

Through the use of entrepreneurship, each individual team member is given the responsibility to improve and create growth for the organization. Providing virtual team members with entrepreneurial responsibility is essential to AMS's continued ability to generate new business. In addition, the responsibility ensures that each team member is tied to the overall success of the company. By spreading an entrepreneurial spirit within the organization, every virtual team member becomes concerned about improvement and growth of the whole. While entrepreneurship initially focuses on the individual, the effects of promoting AMS as a business benefits all virtual team members by bringing in a continuous stream of new projects. As AMS's business grows, each team member is provided more opportunity to take on new and challenging roles.

The entrepreneurial spirit is evident in the SPS team. In a recent CST quarterly review meeting, the following slide (Figure 4.6) was presented to the team. It communicates the balance that each CST member must maintain. Each person's career is enhanced when SPS succeeds in the three circles. The CST must first delight current clients to achieve desired results on existing contracts. This will, in turn, help promote new business for the CST and help the project achieve financial success. New business offers successful CST members new career opportunities. In addition, a financially successful project can invest in its members by increasing the training budget or having a team celebration. Also, team members receive annual bonuses based on company, business unit, and individual project success.



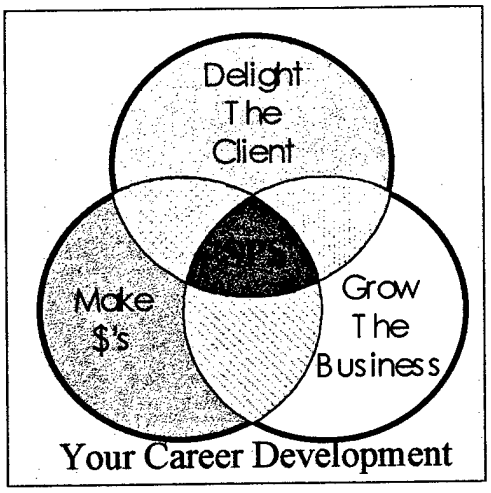


Figure 4.4, SPS Team Focus, from (AMS,1998)

b. Member Ownership

AMS uses a number of monetary and psychological incentives to provide an ongoing stimulus that encourages virtual teams to function effectively. Miles says: "psychological ownership can be achieved by organizing cells as profit centers, allowing them to participate in company stock-purchase plans, and so on. However, the ultimate cellular solution is probably actual member ownership of those cell assets and resources that they have created and that they voluntarily invest with the firm in the expectation of a joint return." (Miles, 1997) This point is clear in AMS's requirement for each associate to make an annual contribution to AMS's intellectual capital. Associates are expected to research and present "lessons learned" papers or insights into new business processes. This contributes to the corporation's knowledge base and strengthens each associate's psychological commitment to the firm.

Profit sharing is another strategy used to encourage member ownership at AMS. Principals and associates are rewarded individually for the profit they generate individually, and as a collective team.

4. Performance Measurements and Feedback

Virtual teams must ensure that feedback mechanisms are in place for a corporate culture to elicit desirable norms and behavior. Feedback mechanisms enable virtual teams to identify undesirable norms that may hinder accomplishment of goals, and these mechanisms become the foundation for corrective programs and tools. Maintaining cultural norms poses a particular challenge within the virtual teams. For the AMS corporation, these managing mechanisms can be broken into job training, employee performance evaluations, and cultural renewal.

a. Training

The case study revealed how AMS employees were encouraged to contribute to the company's knowledge bases. This process invigorates the company with new creativity. At the same time, it serves to train employees and reinforces standardization of company norms. Twice a year AMS personnel come together by video teleconferencing for "Associate Days." These events consist of lectures, workshops, panel discussions, and retreats that provide opportunities to share experiences and reinforce desired cultural norms.

Another training aspect is AMS's use of nine Learning and Professional Development centers. The Learning & Professional Development (L&PD) group was created in 1995 for one purpose: to provide AMS employees with the resources and environment that will enable them to both plan for and respond continuously to client

demands (i.e., provide AMSers the opportunity to learn what they need to learn, when they need to learn it, and to use that learning to deliver superior business results). For the past two years, L&PD has been investigating distance learning. Currently, distance learning is supported primarily by the use of a wide variety of Computer-based Training (CBT) courses. Virtual team members can choose a CBT from the L&PD's CBT database on Lotus Notes. L&PD is currently exploring requirements for facilitating access to subject matter experts and course coaches through the use of video conferencing. This technology is needed to reach the growing number of virtual staff.

b. Performance Feedback

Performance at AMS is maintained through the use of mentors, job fit, and 360-degree reviews. As indicated earlier, each employee, and particularly new AMS employees, is assigned mentors. Mentors are senior employees within the Business Unit and project teams. It is the mentor's responsibility to provide personal and professional counseling for personal and professional growth.

Mentors are also AMS's preferred method for handling conflict resolution. Mentors reduce conflict, help eliminate problems, and encourage integration through professional development of new employees. Mentor/employee relationship is purposely kept casual like a big bother/little bother relationship versus a supervisor/worker relationship. Team members may actually choose a mentor they are comfortable talking with. Because of the relaxed nature of the relationship, communication between mentors and employees can occur in a variety of ways to suit the particular situation. Typically, mentors communicate with virtual team members via phone since it is the only available technology at AMS that supports two-way communication. (VTC systems are not widely

available at AMS). Virtual team members often meet with mentors when they come into the office for other face-to-face meetings.

Another key point in ensuring employee satisfaction and expected performance is AMS's policy regarding job fit. AMS goes to great lengths to find an employee's niche within the company. Employees are encouraged to try new jobs and assignments. By allowing employees to try new things, AMS reinforces two beliefs: 1) AMS values each employee, and 2) AMS supports continual learning.

Finally, AMS makes extensive use of the 360-degree review process. With the use of virtual teams in a matrix organization like AMS, it is difficult to determine an employee's direct boss on any given day. Virtual teams form and disband frequently. An employee may lead a team one month and be a member of a different team the next. Virtual team members may never work with the "boss" they fall under in the organization chart. To ensure its top notch employees get equitably rewarded, AMS uses a 360-degree review process. The employee works with the manager to develop a list of people who evaluate the employee. The list consists of all the people that the employee has worked with for the review period. The list can include clients, managers, co-workers, team members, etc. A detailed survey is given to all people on the list. AMS uses an independent contractor to process the results and identify the employees' strengths and weaknesses.

c. Cultural Renewal

Beyer and Trice (1987) say renewing cultural norms involves a variety of elaborate activities intended to strengthen existing social structures. Along with the numerous training options for AMS employees, AMS makes extensive use of on-line

media such as Knowledge Express and a corporate newsletter called the "Pixel" to reinforce the bond between the Business Units and virtual teams. The newsletter details promotions, advancements, achievements of individuals and project teams, and new innovative ideas.

G. TRUST IN VIRTUAL TEAMS

Trust is an essential component of successful virtual teams. Virtual teams require many levels of trust: trust between team members, trust in the purpose of the team, trust by the organization that the team will accomplish its goal, and trust in the support infrastructure. Without daily face-to-face interaction, trust in virtual teams is harder to attain and easier to lose.

Building trust in virtual teams is a tricky endeavor. Remote project managers must trust the distant team members to accomplish tasks. Virtual team members must trust that project managers appreciate them and consider them a vital part of the organization. Team members must trust each other to reach the team's goal. Also, remote team members must trust the information being distributed.

Virtual team members must have trust in people's competence and their commitment inside and outside their team. Because people demonstrate competence over time, trust between virtual team members can take longer than between face-to-face teams. Often, team members have little knowledge of other team member's background, work ethic, or past performance. Each member must quickly establish his/her credentials and commitment to the project. At AMS, team member credentials, or the lack thereof, is initially established by reputation from past projects. In addition, members establish

themselves by having a positive attitude, being a team player, and contributing the most they can with their given skill set. These qualities are conveyed via e-mails, phone conversations, and voice mails. A team member's lack of credentials is not a problem within AMS's virtual teams. Team members are more interested in the other members desire to learn and reach the project's goals. Trust is established as team members convey to each other (via the virtual team tools) their interest in the project and desire to be part of the team.

An organization's culture and reward mechanisms play an important part in promoting trusting relationships within virtual teams. At AMS, employees are rewarded based on individual goals, team goals, and business unit goals. Each person understands that the company succeeds only if employees work as a team. One employee stated: "Promotion candidates are looked at for their professional knowledge, but even more so, they are looked at for how they shared this knowledge. Mentoring new employees and developing reusable corporate knowledge is a key element in being promoted." (AMS Interview, 1998)

AMS's environment promotes trust because it ties promotion back to the success of the team; individuals are not rewarded solely on individual performance. If a virtual team or team member is struggling, it is in the team's interest to seek help to resolve issues before the foundation of trust is broken. For example, if team members loose faith in a person's ability to perform a task, there are three levels of support that AMS relies on: 1) the team works together to get the member up to speed, 2) the employee works directly with his mentor to correct the problem, 3) the team leader counsels the individual. This type of team-based reward system for virtual teams establishes dependencies between

team members to achieve success as a team. These reward systems help provide each team member a common understanding of one another's motivations. Because teams members are rewarded as a group, trust stems from their shared incentives.

What happens when a virtual team loses or never establishes trust? According to W. Edward Deming, "Without trust, there cannot be cooperation between people, teams, departments, divisions. Without trust, each component will protect its own immediate interests to its long-term detriment of the entire system." (J. Whitney, 1994)

Because virtual teams rely on information exchange for their existence, mistrust can cause the collapse of a team. If team members feel uninformed or, worse, misinformed, they will stop trusting the information and the source of the information. Trust is critical for individual members of the team to work effectively. This is true for all teams, but is even more important to virtual teams where relationships between team members are maintained via e-mail, voice mail, etc. rather than hand shakes and lunches.

Occasionally, SPS virtual teams experience trust issues. One manager interviewed described how trust can be lost in a team. She talked about a "default" trust that exists at the beginning of each project.

> Starting with a default sense of trust is easy because of the expectations we hold each other to as AMSers. When trust usually becomes an issue is when a team member isn't living up to these expectations, when their commitment, product, or conduct is below the norm. When this happens, I act immediately to find out what caused the breakdown...did he not understand the assignment, does he need help getting his skills up to speed, does he have a personal issue that he need assistance with? Usually the issue can be resolved before there is a major breakdown in the team. (AMS Interview, 1998)

Another SPS team member interviewed indicated that trust was rarely an issue on his virtual team experiences. When asked how trust issues were prevented, he sited the

"family" type team environment where each member cared about each other. He indicated that because SPS virtual team members have common interests and backgrounds, they usually become friends. These friendships foster mutual respect and trust not just on this one virtual team encounter but throughout their employment at AMS.

H. VIRTUAL TEAM TECHNICAL INFRASTRUCTURE

Companies have long understood that employees require a supportive work environments to accomplish their goals. In the quote below, AMS President, Philip M. Giuntini, recognizes the importance and necessity of providing the proper work environment:

> Since the roots of our culture and our success are our people, it's important that we create a working environment which offers challenging work in an entrepreneurial culture. We're smart enough to know that providing a non-bureaucratic, flexible workplace with open communication and a supportive environment is the best way to deliver results to clients. (Giuntini, 1997)

But what is the definition of supportive work environment for virtual teams? AMS managers cite the existence of a sound technology infrastructure as a critical enabler for virtual team success. It is easy to understand the vital role technology plays in creating a supportive virtual team work environment. The technical infrastructure forms the blood lines that connect all elements of the team. While the overall effectiveness of the team is dependent on many factors, a poorly designed technical support infrastructure will definitely limit the virtual team's potential for success. Fortunately, the converse is true as well, an optimal technology infrastructure will increase the probability for virtual team success.

As discussed in Chapter II, virtual team subject matter experts recommend four key infrastructure elements exist for virtual team success. Table 4.5 describes how AMS supports each of these areas. As a leader in the information technology industry, AMS has clear advantages in developing a optimal technical infrastructure to support its virtual teams. For the most part, AMS has created a technical infrastructure that mirrors the recommended standard. Table 4.5 describes AMS's technical infrastructure. (AMS Interviews)

Infrastructure Key Element	AMS Infrastructure
Connectivity	• AMS office are connected world-wide via its own intranet. • All offices use LANs to connect PCs and share network resources like printers and file servers. • Users logged into the LAN have access to the Internet. • Almost every AMS employee receives a laptop, network/modem card and a docking station. This combination allow the employee total connectivity whether at the office, at the client site or at home.
Voice, Data , and Video Communications	• All AMS employees are given Octel voice mail accounts • AMS uses Lotus Notes to support e-mail. All AMS employees are given an e-mail account. • AMS has limited VTC capability
Collaborative Software	• AMS provides many COTs collaborative software products like Lotus Notes and several software configuration management tools. • AMS develops many customized collaborative applications like the WOOF issue tracking database
Information Sharing	• AMS used Lotus Notes database to store the majority of corporate and project specific data. • AMS creates Knowledge Center database to store collections of data on particular topics. The SPS project has its own knowledge center. • AMS also uses shared network drives to store data.

Table 4.5 AMS's Technical Infrastructure, from (AMS Interview, 1998)

These elements form the foundation of the AMS's technical infrastructure. But, the foundation is only part of the structure. The critical characteristics of a successful

infrastructure are defined not by the individual components but rather its availability, performance, and reliability.

AMS may have all of the elements of a sound infrastructure, but if the technology is not widely available, the virtual team environment is not supported. For example, the AMS SPS team stores many product presentations and documentation on a network drive available to AMS employees logged into the network. While availability to this drive is wide-spread to users located at AMS offices, remote users (employees who are tele-commuting or at a client site) have limited network access and are restricted to expensive direct dial-up connections (long-distance modem calls) versus free internet connections due to security. This type of limited availability does not provide the maximum flexibility needed to support a virtual team environment. AMS has started to correct limited availability by moving documentation into Lotus Notes. Since Notes provides its own security, it can be used via the Internet at no cost to users not located at an AMS office.

In addition to availability, an optimal infrastructure needs to deliver a reasonable level of performance for all virtual team members both local and remote. Varying levels of performance between virtual team members can cause frustration within the team. A specific example of this occurred on the SPS Acquiline product development team. Team members were asked to log all product bugs into a central issue tracking system for developers to view. The Acquiline issue tracking system (a sister system to the *WOOF* system) was fairly elaborate and contained several graphics. Users with direct connections to the LAN in Fairfax, VA experienced optimal performance; the graphics displayed in seconds and issues could be documented and saved within a few minutes. On the other hand, virtual team members not located at the Fairfax office had to connect via modem to

the system. Because of connection slowness (currently limited to a dial-up bandwidth of 28,800), these team members spent more time trying to use the central issue tracking system then they spent actually testing the Acquiline product. Ultimately, the frustration level was so high for the dial-up virtual team members, that they stopped using the issue tracking software and instead e-mailed a Fairfax, VA-based team member Microsoft Word documents containing the testing results. This resulted in extra work as the Fairfax-based team member had to re-key the information into the issue tracking system. An optimal infrastructure must consider performance issues for all users, especially for virtual team members located outside the "normal" work environment who rely exclusively on the technology for information exchange.

Finally, infrastructure reliability is also critical. As stated previously, the technology infrastructure is the blood line of virtual teams. A kink in the virtual team's blood line will effectively result in the "death" of the team. An unreliable infrastructure breaks the very link that binds together the virtual team. All employees interviewed indicated that AMS's infrastructure was extremely reliable. One SPS team member joked, "I think AMS has triple redundant network connections and Notes servers to ensure we won't miss the opportunity to work." One user indicated that in her four years of employment she could not remember a time when the network and Notes Servers were unavailable. It was reported that occasionally a regional node of the Octel voice mail would go down. But, when this did happen, all voice mail users would receive an announcement documenting the failure and informing users when the node would be back on-line.

SPS virtual team managers and team members agree that AMS's technical infrastructure is far better than most of the government organizations they work with. They strongly support the way AMS has developed the Lotus Notes Database. They frequently use the features built into the Knowledge Express database like on-line benefits, AMS Yellow pages, and Best Practices. They feel that AMS's technical infrastructure is designed to support the virtual team member. Yet, they still have several recommendations on how the infrastructure can be improved to better support the virtual team. Specifically, they recommended that AMS:

- Increase Connection Speed for Tele-commuters: Tele-commuters be provided with high-speed connections (ISDN lines or cable modems) to the AMS wide intranet.
- Increase Connection Speed for Travelers: The AMS network support team increase the baud rate to 56,600 baud on the modems that provide dial-in access to the AMS wide intranet.
- VTC capabilities continue to be investigated. Virtual team members want VTC capabilities at each AMS office and eventually, when technology provides a cost-effective solution, team members want VTC capabilities on their laptops.
- AMS provide 1-800 numbers for dial-up connections to limit the expense of long distance calls and reduce the time employees spend tracking phone calls.
- Increase available tools. AMS continue acquiring and developing software products that assist virtual teams either with daily administrative tasks or with the complexity of distance communication.

As technology continues to change and evolve, AMS must constantly reevaluate its technical infrastructure. The incredible growth in the telecommunications industry may in the near future provide solutions beyond what are currently imaginable.

I. CHAPTER SUMMARY

Chapter IV provides a case study of the use of virtual teams within AMS. The chapter provides an overview of the SPS project. The chapter continues by describing how AMS's virtual teams are designed and function, what tools support the use of virtual teams, and concludes with an analysis of the role culture and technology play in a virtual team environment.

AMS uses virtual teams in some form or another to support most corporate and project specific functions. AMS chooses to use virtual teams because they provide the optimal organizational design that enables AMS to achieve its corporate strategy. AMS's unique culture and organizational structure provides the foundation for virtual teams to flourish.

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

The competitive global nature of business and the availability of robust computer networks has led organizations to search out new business processes for organizing work to maintain a competitive advantage. To address these challenges, organizations have looked to team-based designs and its evolutionary extension--virtual teams. Virtual teams are a new form of small group design emerging to undertake these new business challenges. These teams are defined as groups of geographically dispersed people who primarily interact electronically and who meet face-to-face infrequently, if ever. What differentiates virtual teams from traditional teams is that they continually cross time and space boundaries with the support of communication technologies.

Organizations can realize many benefits by implementing virtual teams. Virtual teams allow team members to be located anywhere at anytime. They allow for recruitment of team members based on competencies, not physical location. Most importantly, virtual teams help organizations effectively deal with the realities of time compression, distributed resources, increasing dependency on knowledge-based input, the need for flexibility and adaptability, and the fact that most of the information we use today is in electronic form. Finally, virtual teams take advantage of electronic infrastructures, enabling the team members to work in parallel rather than serially and to have continuous access to the latest and best knowledge and information while working from their home-sites. All in all, virtual teams benefit corporations by helping solve new challenges through the use of communication technology.

While virtual teams take an important step toward solving corporate challenges, many important issues must be addressed. While companies can achieve significant benefits from the introduction of virtual teams, there are also several pitfalls that must be avoided to realize the full potential of these benefits.

Like all teams, virtual teams must be developed, managed, and supported. Unlike traditional teams, virtual teams face additional challenges in many areas such as communication and trust. The table below describes some key issues faced by virtual teams.

Virtual Team Issues	
Virtual Team Issue	**Need/Impact**
Technology Infrastructure Issues	• Virtual teams require a reliable and effective technical infrastructure to effectively accommodate the absence of face-to-face communications. • The technical infrastructure acts as the communication enabler. • An insufficient infrastructure impacts the team's ability to communicate and collaborate.
Communication Challenges	• While the technical infrastructure provides the tools for communication, team members still must apply these tools. • Because team members are geographically dispersed, communication is the single most important factor in determining the success of virtual teams. • Lack of effective communication can result in issues of trust, confidence, and dependency on other virtual team members.
Virtual Team Leadership Issues	• Virtual team leaders must clearly communicate their vision, project purpose, and goals • Insufficient leadership impacts the team's cohesiveness and focus.
Virtual Team Trust Issues	• Virtual teams require many levels of trust: trust between team members, trust in the purpose of the team, trust by the organization to accomplish the goal, and trust in the support infrastructure. • Trust must exist for virtual teams to work effectively. A virtual team will eventually collapse if members do not trust one another.
Cultural Issues	• Culture defines organizational norms and helps set expectations. • Virtual teams require a supportive culture that encourages information sharing and rewards teamwork.

Table 5.1, Virtual Team Issues

B. CONCLUSIONS

1. What are the Essential Building Blocks for Virtual Team Success?

This research shows, based on lessons learned from AMS's application of virtual teams and research publications, that the most significant factors leading to virtual team success or failure are the 1) selection of the right team members, 2) clarity of purpose, 3) robustness of technical infrastructure, and 4) supportiveness of the organization's culture. Virtual teams must consist of the appropriate skill mix and the right combination of personalities and experience to achieve the intended goals. They must also have a clear purpose, and all members must understand the team's goals and the role they play in achieving these goals. Virtual teams are enabled by the communication infrastructure. The team must understand what resources are available via the infrastructure and how to use them. Finally, a virtual team must be supported by a culture that encourages information sharing and rewards teamwork. A virtual team flawed in any one of these four key success areas may fail.

2. How Does AMS Rate in the Four Virtual Team Key Success Areas?

While AMS virtual team members' opinions varied on the quantity and quality of support they received, most felt that overall AMS provided adequate resources to support the use of virtual teams. The table below rates AMS in the four key success areas based on feedback from virtual team members and managers:

AMS Virtual Team Rating		
Area	**Rating**	**Feedback/Comments**
Selection of Team Members	Good	• Virtual team members usually selected based on skill set required by team. • Occasionally, team members assigned based on availability. This can strain the team by forcing member to get up to speed too quickly.
Clarity of Purpose	Excellent	• Because AMS is a consulting firm that is contracted for specific work efforts, project purpose is usually clearly defined in a legal contract. Virtual teams are formed to reach the goals outlined in the proposal. Usually members of the virtual team participate in proposal preparation. • Rarely is a team formed without a specific outcome defined. But, occasionally managers fail to relay big picture goals to virtual team members.
Infrastructure	Good	• AMS has a fairly sophisticated infrastructure consisting of a world-wide intranet that connects all office's Lotus Notes Databases. • AMS has established best practices for building corporate knowledge in its Notes databases. • While the intranet is reliable, it provides slow access to remote users who have to dial-in at 28,000 baud to access Notes Servers and Networked drives. • AMS continues to explore new technology to increase effectiveness of virtual team members and reduce remote costs. • AMS makes use of voice mail as a primary means of communication with remote virtual team members.
Culture	Excellent	• AMS has a strong culture that rewards team work, information sharing, and mentoring. • AMS ties these basic corporate values to recognition, rewards and promotion. • AMS's culture provides a supportive and trusting environment in which virtual teams thrive.

Table 5.2 AMS Virtual Team Rating

In general, employees interviewed agreed AMS has the right tools to effectively implement virtual teams. But, as one manager pointed out:

> We are only just now beginning to learn about how virtual teams work at AMS. While we are starting to build an environment to support them, we are building it in conjunction with deploying the teams. It would be nice to have all the details of how to support virtual teams documented in a Best Practice, but we need to use the teams and collect their lessons learned to be able to define the corporate Best Practice. For now, they are our Guinea pigs and they are doing surprisingly well. (AMS Interview, 1998)

The concept of the virtual team and the virtual organization is still evolving. While this research shows that AMS has successfully implemented virtual teams on its SPS project, this does not imply that all companies will share this success. AMS has numerous advantages that allow them to prosper as a virtual organization. These include:

- A technically proficient workforce that understands how to use technology to support virtual teams.
- A high-tech technical infrastructure supported by hardware and network experts. AMS uses the same resources it markets for consulting support to maintain their own infrastructure.
- A culture that is used to being virtual. Consulting firms have always had "virtual" elements to them. Consultants have always left the corporate office to provide consulting services to a client located in a different state or country. Consultants are used to being dispersed across client locations. The advances in telecommunications have allowed consulting firms teams to take this concept to the next level.

3. What External Conditions Influence Organizations to Transition Towards Virtual Teams?

The growth of the virtual organization and virtual teams can be attributed to several external environment factors:

- The globalization of business competition and customer relationships.
- The pace at which businesses now run demands faster decisions from distributed resources located anywhere.
- The shift from a manufacturing-based economy to one that is information-based, where the value of the intellectual content of the product is as important as the physical content itself.
- The increased problems and costs associated with traveling from the central office to the client site.
- The explosion of information technologies that allow immediate and productive information exchange.

The external environment is driving businesses towards virtual enterprising and the use of virtual teams. Virtual teams make it possible for organizations to draw upon vital resources as needed, regardless of where they are located. These collaborative network virtual teams deliver a better quality product that leverages the strengths of individual team members.

While these external factors are driving organizations toward virtual organizations, companies need to assess whether the use of virtual teams is appropriate before employing them. Often, managers are so excited about practicing the latest industry "hot topic," they forget to look at its true applicability to their organizations. Organizations need to review their employee skill base, leadership ability, technical infrastructure, and culture to determine if they are ready to use virtual teams. Managers should use virtual teams when the nature of the work requires skill sets that can not be filled by the local work force. The work must also lend itself to be completed via technology currently available. In addition, companies need to ensure that virtual teams are working to benefit both employer and employee.

A common mistake is to implement a virtual team to accommodate a resource issue such as the relocation of a primary team player or an employee's desire to work from home. While flexible work environments are a benefit of virtual teams, other factors such as the technical infrastructure must be considered. Before employing a virtual team the company should ask the following questions:

- What benefits are realized by bringing this geographically dispersed group of people together?
- Does the nature of the task lend itself to completion via a virtual team using available technology?

- Do we have the proper technical infrastructure to support the work required to reach the project goals?
- Do we have leaders that can communicate effectively in a virtual environment?
- Do employees possess the proper skills such as independence, self-motivation, and willingness to communicate to work in a virtual environment?
- Does our culture provide a supportive and trusting work environment?
- Do we have collaborative software products that will allow the virtual team to function effectively?
- What are the risks associated with using a virtual team to complete this task.?

Based on the answers to these questions, the company should weigh the benefits and risks of using a virtual team to meet project goals.

4. Commitments and Investments in Virtual Team Success

The effective use of virtual teams does not just happen without corporate planning. Companies must invest in the tools needed to support virtual teams, particularly a high-tech communication infrastructure. In addition, companies must train leaders and members to understand the special needs of virtual teams and to use technical tools like Lotus Notes for virtual team success. Finally, companies must be committed to developing a culture that provides the supportive, open, trusting work environment required by virtual teams. In short, the culture must be the "glue" that unites employees regardless of geographic location.

Investing in a technical infrastructure. Since there is consensus on the basic requirements of a technology infrastructure capable of supporting virtual teams, why do so many companies fall short of meeting this standard? The answer is simple: developing a company-wide, high performance, fully integrated infrastructure available to all users is expensive. Companies must balance the expense of the top-of-the-line infrastructure with

the benefits it provides. More and more, companies are realizing that an investment in this type of technology can result in substantial long-term benefits. These benefits include better resource utilization, better management and building of corporate intellectual property, and increased ability to respond to changing markets. In addition to the expense, companies must also obtain expertise to implement and manage a complex infrastructure. As advances keep coming in the telecommunication industry, companies are scrambling to understand what new communication technologies to implement and when to implement them.

Although infrastructures are in flux and fall short of being optimal, virtual teams must adapt to less than perfect conditions. The impact, though, of a poor infrastructure is significant. If the team does not have the proper tools to do its job, in this case the proper infrastructure to support the virtual team, the team will struggle to perform basic team functions such as: task delegation, issue resolution, team meetings, document sharing, etc. Every minute that a virtual team has to spend dealing with limitations due to geographic distance is a minute the team is not working to achieve its goal.

Investing in virtual team tools. Companies must invest in the tools that support effective communication and collaboration between virtual team members. Companies should develop research teams that investigate new technologies and evaluate their potential value. Investment in corporate research and development teams can not only prevent bad software decisions but also help determine the right kind of communication hardware and software that can result in significant productivity enhancements of virtual team members.

Investing in culture. Smart managers recognize the import role culture plays in determining the overall success of the company. As organizations become increasingly virtual, managers must strive to maintain the corporate culture across their geographically dispersed employee base. Virtual corporations must know who they are and what they stand for in order to effectively translate these values to virtual team members. Managers must align virtual team members to the organization through the use of motivation, recognition, and rewards. Virtual teams rely on cultural norms to set expectations of one another. Cross-organizational virtual teams can exist where members do not share the identical culture, but only if these organizations share core values.

C. RECOMMENDATIONS

Observations of AMS's SPS project show how virtual teams can be implemented to solve a number of business challenges. As stated previously, AMS has many advantages that assist in the implementation of virtual teams. Organizations without these advantages may still benefit from virtual team implementation, but, may have additional hurdles to overcome. For example, leaders attempting to apply virtual teams in a DoD/DoN organization are likely to face challenges relative to organizational structure, culture, and technology infrastructure. The DoD's machine bureaucracy does not easily lend itself to the cross-functional flexibility utilized by virtual teams. However, this research shows that, based on lessons learned from AMS's use of virtual teams, this form of team does have potential and applicability within the DoD/DoN environment in the context of specialized functions and projects. Virtual teams hold much promise for

conducting DoD/DoN project tasks with dispersed resources in areas such as acquisition, program management, and logistic support.

Based on virtual team research and the case analysis of AMS's use of virtual teams, several recommendations can be applied and implemented within the DoD/DoN environment as virtual teams become a mechanism for evolutionary restructuring and reformation of work team processes. These recommendations, while derived specifically from the AMS case analysis and academic research, are stated in general terms.

1. Begin As A Team

Virtual teams benefit greatly from attending a face-to-face project kick-off meeting. This meeting allows the team to make human connections with team members. In addition, it allows the manager to explain project goals and resources to all members at the same time. This interaction helps put the team on "the same page" and establishes credibility. Face-to-face meetings help to humanize virtual team members' relationships and build trust within the team.

2. Foster Regular Communication

Communication via e-mail, voice mail, phone, or VTC is essential to virtual team success. Virtual teams should develop a communication strategy at the beginning of the project describing how and when team members will interact. These rules of communication conduct help unite the team and minimize communication mishaps.

3. Present a Clear Purpose and Unified Strategy

From the beginning, virtual team managers should outline goals for the project and strategies to achieve them that will be followed by all members. A purpose statement that includes the project's scope as well as what is beyond scope, and the project's success

criteria must be understood by each team member. In addition, managers should work with the team to decide how they interact to address issues like critical project risks, internal team issues, schedule slips, and employee reviews.

4. Provide the Proper Resources

Sufficient organizational support is a key factor in the success of virtual teams. Resources are not limited to the technical infrastructure that links virtual team members. Resources also include access to corporate knowledge centers, human resources, training material, an project details. A productive virtual team member needs to be integrated with corporate support mechanisms regardless of location.

5. Recruit the Right Team Members

Virtual team members need the right mix of independence and team skills to flourish in this environment. In addition, virtual team members need to bring a specific talent to help the team reach its goal. Those who are proactive and enjoy "playing" with technology can contribute most effectively to virtual team projects. Often, virtual teams fail when members are selected solely based on life-style requirements (need to work from the home) rather than skill set and project fit.

6. Modularize Work

Modularizing work can help divide project work among virtual team members. Assigning distinct tasks to each site or team member from the beginning will prevent overlap. Establishing ownership of certain pieces of the project ensures that one site does not duplicate the work of another. If task assignments are maintained in this manner, integrating modules will be easier later in the project.

7. Establish Consistent Hardware and Software Platforms

Standardizing hardware and software helps virtual teams minimize communication overhead and encourages information sharing. Identifying how data will be organized and where information will be stored can prevent costly configuration management errors. In addition, the use of collaboration technologies, such as configuration management tools, can help control the transport of data within the team.

8. Establish a High Performance Communication Infrastructure

Virtual teams require communication tools to compensate for the lack of face-to-face communication. The faster and easier these tools are to use, the more productive the virtual team can be. Team members who are limited by slow modems, unreliable network connections, or server down time may experience significant frustration. The communication infrastructure can either enable a virtual team member or handicap him.

D. RECOMMENDATIONS FOR FURTHER STUDY

1. DoD Virtual Team Integration

Examine the role of virtual teams in specific DoD programs. Determine what tools and methods would be required to support this type of work team design. Explore the advantages provided by the virtual teams, and determine how effective they are at addressing DoD's downsizing, scattered resources, and technology new challenges. Look at programs such as DoD Acquisition, DoD Program Management, and DoD Logistics for virtual team applications.

2. Information Technology/Communication Infrastructure

Assess the DoD technical infrastructure and determine needed improvements for the implementation of virtual teams. Develop specific DoD guidelines that establish minimum components needed to support a virtual team environment.

3. Virtual Team Personnel Impacts

Conduct research on how the use of virtual teams impacts virtual team members' growth and professional development. Explore reward systems that motivate team success coupled with individual achievement. Determine the relationship between virtual team dependencies and trust.

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APPENDIX: AMS VIRTUAL TEAM QUESTIONS

1. How are virtual teams being used to support your current project? Specify project size and duration.
2. What characteristics do you consider when choosing members of a virtual team? Why are these characteristic important
3. What was your role on this team? (team leader, functional specialist, technical lead, etc.)
4. What was the membership of this team. Where were members physically located? Why were members not centrally located?
5. Describe which of the communication technologies were used to support your virtual team, the frequency of use, and the effectiveness.

Media	Purpose/ Frequency	Effectiveness/ Need	Comment
Face-to-face meetings			
Video Conferencing			
Telephone			
Voice Mail			
E-mail			
Collaborative Software (i.e. Lotus Notes)			
Internet/Intranet applications (Web pages)			

6. How were accomplishments celebrated and rewarded?
7. How were problems or conflicts resolved?

8. Describe how membership in a virtual team differs from membership on a traditional team? Are your relationship stronger/weaker with members of a virtual team or a traditional team?
9. What were some of the challenges/obstacles faced by the team due to its virtual nature? (Collaboration, trust, leadership, etc.)
10. What if anything would make virtual teams more effective from a productivity or member satisfaction perspective?

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